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EXAMPLE DOCUMENTATION REPORT FOR 1990 BASE YEAR OZONE AND CARBON MONOXIDE STATE IMPLEMENTATION PLAN EMISSION INVENTORIES

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EXAMPLE DOCUMENTATION REPORT FOR 1990 BASE YEAR OZONE AND CARBON MONOXIDE STATE IMPLEMENTATION PLAN EMISSION INVENTORIES

BY

Radian Corporation
Research Triangle Park, NC 277 11

EPA Project Officer: William B. Kuykendal

Office Of Air Quality Planning And Standards
Office Of Air And Radiation
U. S. Environmental Protection Agency
Research Triangle Park, NC 277 11

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EPA-450/4-92-007

EXECUTIVE SUMMARY

In November 1990, the Clean Air Act Amendments of 1990 (CAAA) were passed by Congress and signed into law by the President. Title I of the CAAA contains provisions on the required development of emission inventories for designated areas that failed to meet the National Ambient Air Quality Standards (NAAQS) for ozone and carbon monoxide (CO). These inventories are to be prepared as a part of a State's revisions to its State Implementation Plan (SIP) to formulate a strategy to attain NAAQS.

The U. S. Environmental Protection Agency (EPA) has developed and published several guidance documents delineating how the 1990 base year emission inventories specified in Title I are to be prepared. Implementation guidance has been prepared detailing minimum inventory requirements and specific procedures to be followed during inventory preparation. The chief procedural guidance document is Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone. Volume I: General Guidance for Station- Sources (EPA-450/4-91-016), which is known simply as the Procedures Document. Minimum inventory requirements for ozone and CO nonattainment areas are described in Emission Inventory Reauirements for Ozone State Implementation Plans (EPA-450/4-91-010) and Emission Inventory Reauirements for Carbon Monoxide State Implementation Plans (EPA-450/4-91-011), known collectively as the Requirements Documents.

This report is meant to enhance and supplement the Procedures and Requirements Documents. It is not, however, intended as an additional Procedures or Requirements Document. The audience for this report is any State or local air pollution control agency responsible for compiling a 1990 base year SIP inventory for ozone and/or CO.

The primary intent of this report is to provide States with instructional guidance on how to present and document data for an inventory. Illustrative examples for each of the principal constituents of an ozone and CO emission inventory are presented, along with guidance on content and format. The guidance is purposefully brief and is directed to highlight the generic issues surrounding the documentation of an emission inventory, although enough detail is

provided to ensure compliance with published EPA requirements and to facilitate timely and effective EPA review and evaluation. The goal of this report is not to address all source category types or potential emission situations.

The overall report is structured along the lines of the documentation outline given in the ozone and CO Requirements Documents. The principal components of development and documentation for 1990 base year inventories addressed in this report include stationary point sources,. stationary area sources, non-road mobile sources, on-road mobile sources, biogenic emission sources, quality assurance implementation, emissions summaries, and basic reporting requirements. Each section in this report is a discrete discussion focusing on one of these principal components. As such, the discussions within a section are independent from the discussions in other sections and are not intended to necessarily be consistent. For example, source or county names may not match, emissions or activity data may not match, etc.

Each section of this report contains a group of examples that represents a subset of the overall category. For instance, there are over 20 stationary area source categories, but examples are only provided for eight categories. These eight examples address the general range of issues pertinent to documenting area source category emissions for 1990 SIP inventories. Instructional guidance is provided for these eight illustrative categories, as well as for the minimum and essential needs (e.g., list of all categories addressed, list of those not addressed and why, summary emissions by category by county, etc.) for stationary area sources in general. The examples given in each section are fictitious and serve only illustrative purposes. This document should not be used as a reference for emission factors, activity levels, or emission estimation methodologies.

TABLE OF. CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF FIGURES

SECTION 1

INTRODUCTION

1.1 DOCUMENT PURPOSE AND ORGANIZATION

The primary intent of this guidance document is to provide State and local air pollution control agencies with a guide for presenting and documenting their 1990 base year ozone and carbon monoxide (CO) State Implementation Plan (SIP) emission inventories. The document contains illustrative examples of how agencies should present and verify their emission inventory development efforts in order to demonstrate adherence to published U. S. Environmental Protection Agency (EPA) requirements and specifications. Presenting inventory information in the suggested form will also result in a more timely and effective review, evaluation, and approval of the data by EPA.

The guidance information presented in this report is designed to enhance and supplement previously issued EPA guidance that addressed inventory documentation needs either directly or indirectly. The documents, Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone. Volume I: General Guidance for Stationary Sources (EPA-450/4-91-016), known as the Procedures Document, and Emission Inventory Requirements for Ozone State Implementation Plans (EPA-450/4-91-010) and Emission Inventory Reauirements for Carbon Monoxide State Imulementation Plans (EPA-450/4-91-011), known collectively as the Requirements Documents, provide indirect guidance on how to document emission inventory estimates. The EPA report Example Emission Inventory Documentation for Post-1987 Ozone State Implementation Plans (SIPs) (EPA-450/4-89-018) directly addresses inventory documentation needs, but not for 1990 inventories. However, much of the general documentation guidance given for post-1987 inventories is still applicable for 1990 and is further embellished by the examples for 1990 shown in this guidance document.

The guidance for 1990 inventories consists of focused instructional material supported by illustrative examples for each of the principal constituents of an ozone or CO emission inventory.

The guidance is directed to the generic issues surrounding inventory documentation and not to category- or site-specific details. The examples show the fundamental basis of what EPA is looking for in terms of documentation. For this reason, not every conceivable scenario in the inventory documentation process is addressed in this report.

This report comprises eight sections. Section 1.0 contains a summary of the report's structure and overall purposes. Section 2.0 discusses essential elements of inventory presentation that must be followed in order to generate a reviewable inventory product. Sections 3.0 through 8.0 address the primary components of a 1990 base year inventory as set forth in the Requirements Documents. Each section is a discrete discussion that is not necessarily intended to be consistent with the others (e.g., source or county names may not match, emissions or activity data may not match; etc.).

Within each section, instructional guidance is provided that reinforces which information is needed to ensure adequate documentation. The examples tangibly illustrate the instructions and provide templates for implementing the instructions. It should be noted that the text and numbers in the examples do not necessarily represent real data. Most of the emissions and activity level data are fictitions and should not necessarily be considered representative of a given source or source category.

All of the examples appear in ***bolded italics*** to distinguish them from the instructions and information presented as part of this guidance document. In cases where the example is a figure or a table, the title appears in ***bolded italics***. States are not bound to use the exact same tabular or graphical formats suggested here, but something that approximates the content of the example should be used.

Under no circumstances should this document be used as a reference for emission factors, activity levels, or emission estimation methodologies.

SECTION 2

ESSENTIAL ELEMENTS OF INVENTORY DOCUMENTATION

From EPA's experience with the Post-1987 ozone/CO emission inventories that were submitted for review, it became evident that there was a need to define and clarify essential elements associated with documenting an inventory in written report form. Although several of these elements may seem trivial, they constituted significant problems in trying to conduct quality reviews of the Post-1987 inventories. These elements and the proper procedure for handling them are discussed in the following paragraphs.

2.1 COVER PAGE

Each inventory documentation report should contain a cover page that clearly delineates the following items:

- Type of inventory being submitted (ozone or CO), including pollutants addressed;
- Geographic area covered or addressed;
- Status of inventory (draft or final);
- Report date;
- Report preparer (if different from responsible agency - e.g., a consultant or university); and
- Responsible agency submitting inventory.

This information is particularly helpful in cases where only partial data are being submitted, e.g., only VOC emission estimates, only point source data, only mobile source NO, estimates, etc. This information is also needed if multiple agencies are submitting different parts of the inventory. For example, County A may have an autonomous agency that prepared and submitted its own point source data, while the State agency is doing all the other source types. An example cover page is shown in Table 2-1.

TABLE 2-1. EXAMPLECOVERPAGE

1990 BASE YEAR OZONE EMISSION INVENTORY

FOR VOLATILE ORGANIC COMPOUNDS (VOC) EMISSIONS

for

Ozoneville, North Carolina, Nonattainment Area

DRAFT SUBMITTAL

April 1992

Prepared by:

Ozoneville Air Pollution Control Agency
123 Maple Street
Ozoneville, North Carolina 01234

2.2 PAGE NUMBERS

It is essential for organization and subsequent evaluation that all inventory reports be systematically page numbered. Many of the Post-1987 inventory submittals were deficient in this area. Correct page numbering is also required in order to produce a valid Table of Contents. One method for numbering pages is to begin each section of the report with page number 1 preceded by the section number, as shown in Table 2-2.

2.3 TABLE OF CONTENTS

Almost all of the submitted inventory documents failed to include any kind of table of contents or other organizational index, which made it difficult to locate information within the reports. All inventories should include a logically organized table of contents that covers the main text and the appendices. A complete list of tables and list of figures/graphs should also be included. Ideally, the document should be organized by an easy-to-follow numerical system consisting of ordered headings. Table 2-2 shows an example Table of Contents and numerical heading system. Tables 2-3 and 2-4 show standard presentations for lists of tables and figures, respectively. Accompanying material (see below) should be identified and listed at the end of the Table of Contents.

2.4 ACCOMPANYING MATERIALS

It is recommended that agencies provide accompanying supportive data, such as computer printouts or PC disks, separately from the report. It is crucial, however, that any such material be clearly labeled as to what it is, where it applies in the inventory document, and how it was used in the inventory development process. If the material is not defined in the primary document, the label should also provide the material's reference or source. An example of what

TABLE 2-2. EXAMPLE OF A TABLE OF CONTENTS FOR 1990 SIP INVENTORY DOCUMENTATION

*TABLE 2-3. **EXAMPLE** OF A LIST OF TABLES FOR 1990 SIP INVENTORY EMISSIONS DOCUMENTATION*

TABLE 2-4. *EXAMPLE OF A LIST OF* ***FIGURES*** *FOR 1990 SIP INVENTORY DOCUMENTATION*

is minimally desired by EPA for labeling a computer printout that is submitted as accompanying material to an inventory documentation report is shown below (as ***Attachment C***).

ATTACHMENT C

1990 OZONEVILLE SIP OZONE INVENTORY DOCUMENTATION REPORT

Ozoneville Air Pollution Control Agency
123 Maple Street
Ozoneville, NC 01234

This attachment is a computer printout of state employment data by SIC code for SICs 10-79. The data were generated by the State Commerce Department from the 1990 Census of Employment database. The data were used to determine county level employment by 4-digit SIC code for use in area source emission estimation routines. Employment figures were developed for dry cleaning, degreasing, auto body refinishing, architectural coating, and eight industrial surface coating area source categories. The methods used to convert these raw employment numbers into SIC category values on a county level are discussed in Section 3.2 of the inventory documentation report. The results were in turn used for emission estimation in Sections 3.3 - 3.6 and 3.9 - 3.16.

2.5 INTEGRATING DATA PROM MULTIPLE GROUPS

One particularly troublesome problem during the preparation of Post-1987 emission inventories involved the lack of coordination when different agencies developed different parts of the inventory. It is recognized that within a given nonattainment area, there may exist two or more agencies (State, county, or local) with jurisdiction over one or more counties/cities in the nonattainment area. While county or local agencies may want to assemble all or parts of the inventory for their jurisdictions, it is crucial that the central State air pollution control agency with the principal responsibility and authority for the 1990 base year inventories coordinate and integrate every contributing agency's inventory components into a coherently integrated inventory documentation package presented in accordance with the guidelines contained in this document and other pertinent EPA SIP inventory guidance documents. When multiple agencies are involved in the inventory process, the role and bounds of each group's work must be clearly defined.

2.6 DOCUMENT SECTIONS

The information in the emissions inventory report should be organized into sections, each of which addresses a specific topic. In general, an inventory report will contain some or all of the following sections:

Section 1.0 BACKGROUND AND SUMMARY

Section 2.0 STATIONARY POINT SOURCES

Section 3.0 STATIONARY AREA SOURCES

Section 4.0 NON-ROAD MOBILE SOURCES

Section 5.0 ON-ROAD MOBILE SOURCES

Section 6.0 BIOGENIC SOURCES

Section 7.0 QUALITY ASSURANCE IMPLEMENTATION

These section headings (but not the section numbers) correspond to sections in this guidance document; therefore, the information to be included in each section of the inventory documentation report can be easily determined.

SECTION 3

BACKGROUND AND EMISSIONS SUMMARY

The Background and Emissions Summary section of a State's 1990 emission inventory report should contain an overview discussion on how the inventory was prepared and a summary of the emissions estimates that were developed. The Background section should answer the basic who, what, how, and why questions associated with the inventory. Section 3.1 of this report shows the topics to be covered in the background discussion and examples containing the level of detail expected. Guidance for presenting the Emissions Summary is provided in Section 3.2.

The final item that should be provided in this section of the documentation report is a description of how the report is organized. Section 3.3 provides a brief example paragraph that illustrates the desired approach.

3.1 BACKGROUND

In the Background portion of the emission inventory documentation, the inventory preparer or agency submitting the inventory should discuss the following essential topics.

- Type of inventory;
- Pollutants covered in the inventory;
- Sources addressed in the inventory;
- Geographic area covered in the inventory;
- State agency responsible for submitting the inventory;
- Agencies/groups that prepared the inventory;
- Contact people for the inventory and its components; and
- Basic underlying assumptions or issues associated with the inventory.

Examples of the kinds of material that could be presented to discuss these topics are shown below.

Type of Inventory, Pollutants. and Source Categories

This document presents the 1990 base year ozone SIP emission inventory for the Ozoneville nonattainment area. The inventory addresses volatile organic compound (VOC), oxides of nitrogen (NO_x), and carbon monoxide (CO) emissions from stationary point, stationary area, on-road mobile, and non-road mobile emission sources. Emissions of VOC are also addressed for biogenic sources.

Geographic Area

The emissions inventory covers the Ozoneville nonattainment area, which was designated as a serious nonattainment area for ozone by EPA in a November 6, 1991, Federal Register notice (Vol. 56, No. 215, 56694). The Ozoneville nonattainment area is shown in the map in Figure 3-1. This inventoried area includes both the designated nonattainment area and a 25-mile extension around the nonattainment area for large point sources. In addition to the metropolitan area of Ozoneville, the nonattainment area encompasses Counties A, B, C, and D. The 25-mile boundary surrounding the nonattainment area encompasses portions of 12 additional counties. As can be imagined, a strict 25-mile boundary does not coincide with county or other jurisdictional lines. For the purpose of developing a clear definition of the inventory area boundary and to avoid unnecessary judgement calls pertaining to the precise location of particular facilities in relation to the nonattainment area borders, the inventory area boundary was conservatively defined to include all portions of the 12 surrounding counties, as clearly illustrated in Figure 3-l.

If an area is required to perform air quality modeling for attainment demonstration purposes, the necessary geographic description may be more comprehensive than that needed for non-modeling areas. If modeling is required and the modeling domain area is larger than the designated nonattainment area, the expanded inventory and modeling boundaries hypothetically

shown in Figure **3-1** need to be specified. Individual counties in the modeling domain inventory also need to be identified.

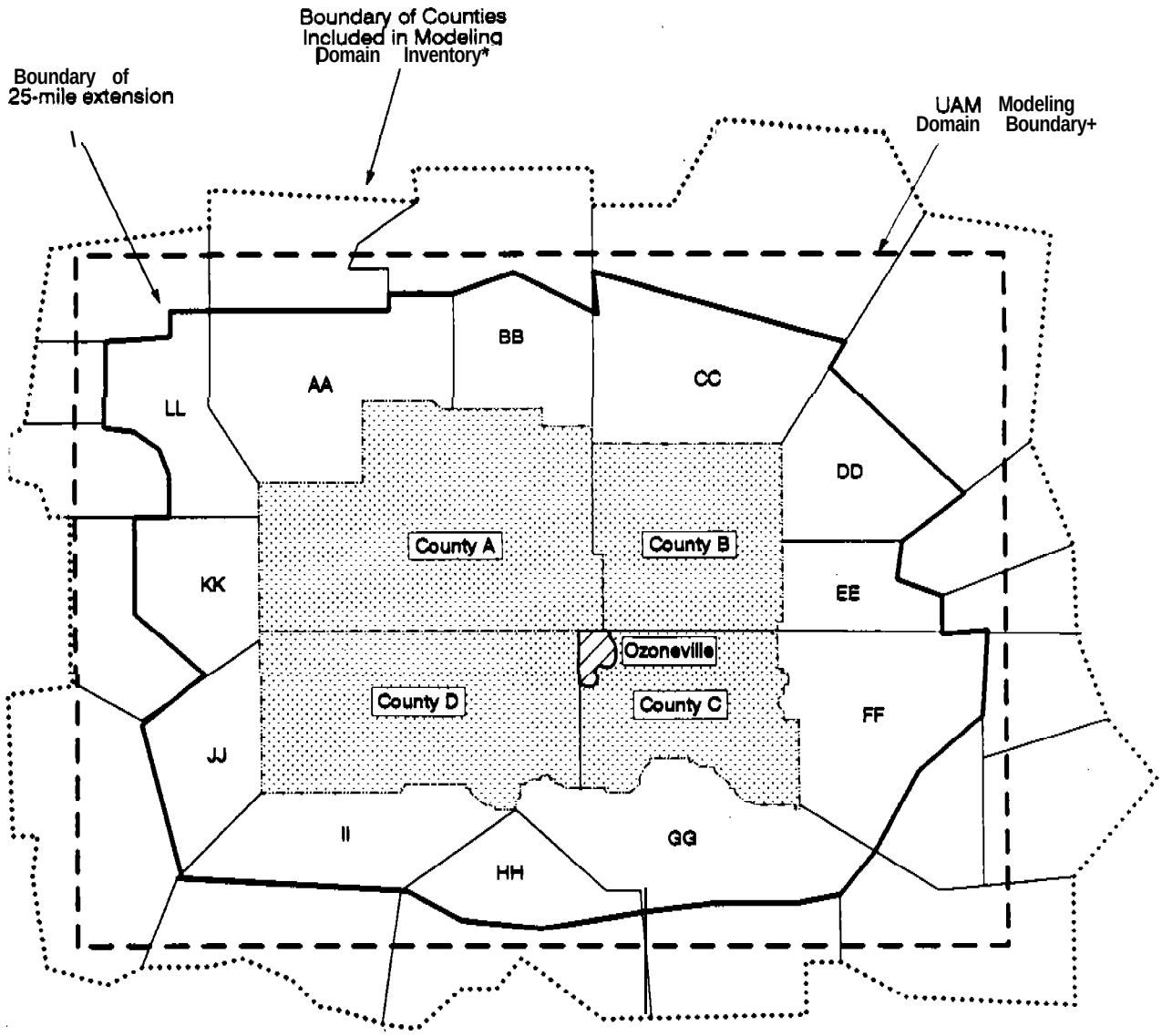
Agencies/Contacts Responsible for the Inventory

The agency with the direct responsibility for preparing and submitting the Ozoneville nonattainment area 1990 base year ozone SIP inventory is the Ozoneville Regional Planning Authority (ORPA). The ORPA was directly responsible for coordinating and supervising the completion of each segment of the inventory. Several other State and local agencies contributed information that was necessary for preparing emission estimates, The State Department of Environmental Regulation (DER), the Ozoneville Department of Public Health (ODPH), and various other State departments (e.g., Labor, Commerce, and Energy) provided activity level data for use in the non-road area source inventory.

The point source inventory was prepared primarily from the results of a mail survey by the DER. In selected cases, the survey results were augmented with information obtained through personal contacts by DER staff. The majority of the on-road mobile emissions calculation information was provided by the Ozoneville Department of Transportation (ODOT). The ODOT ran all necessary transportation planning models to develop vehicle miles traveled (VMT) estimates and the MOBILE4.1 model to determine vehicle emission factors. The contact persons for ORPA and the other major contributors to the inventory are listed in Table 3-1. The exact mechanisms by which each of these groups supported the development of the base year inventory are explained in detail in the appropriate source type documentation section.

Basic Assumptions/Issues

This section should address those cases where underlying data, assumptions, or other parameters are used in one or several parts of the emissions inventory. An example of this kind of information is demographic statistics characterizing the four counties in the Ozoneville



*Note: specify for areas required to perform air quality modeling for attainment demonstration purposes

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Figure 3-1. Map of the Inventory Planning Area for the Ozoneville Nonattainment Area Emissions Inventory - 1990 Base Year

TABLE 3-1. LIST OF CONTACT PERSONS FOR THE OZONEVILLE 1990 BASE YEAR OZONE INVENTORY

Agency	Responsibility	Contact/Telephone Number
Ozoneville Regional Planning Authority 1313 oak street Ozoneville, USA 54321	Lead agency, overall inventory coordination and supervision	John Smith (111) 123-4321
State Department of Environmental Regulation 535 Ridge Road Capital, USA 5432 1	Point and area source emissions data and area source activity levels	Jane Doe (555) 11 l-2233
Ozoneville Department of Public Health 720 West Avenue Ozoneville, USA 5432 1	Area source activity level and emission factor data	Dr. Bill Plant (111) 321-1234
Ozoneville Department of Transportation 678 North Highway Ozoneville, USA 54321	VMT generation, MOBILE 4.1 emission factors, and all other highway vehicle data	Jim Summer (111) 987-6543

nonattainment area, as shown in the example in Table 3-2. These data are crucial to several of the area source category emission estimation procedures. The State may want to present and document commonly used and cited data in the Background section and refer back to them as needed rather than repeat the data multiple times throughout the inventory report. The original references for any such data should also be presented.

The section would also encompass any unique aspects of the inventory that affected the overall development of the inventory or any of its components. For example, if the inventory area was experimenting with requiring reduced Reid vapor pressure fuels at 8.0 psi during 1990, this would need to be discussed, as it would have had significant effects on the development of the on-road mobile inventory. Another example might be the need to mention that three out the area's five highest VOC emitting point sources were not included in the inventory because the. plants had been closed in 1990 because of recession-related problems.

3.2 EMISSIONS SUMMARY

In the Emissions Summary portion of the emission inventory documentation, States need to provide the overall results of their inventory development efforts on a pollutant, source type, and geographic basis. Emission estimates should be provided in terms of both annual and daily seasonal (ozone or CO) emissions. Source categories such as biogenics or highway vehicles, where annual emissions are not generally calculated, can be excluded.

The source type breakdown should address the five major classes of sources: stationary point, stationary area, non-road mobile, on-road mobile, and biogenic. Some States may prefer to include non-road mobile sources with stationary area sources or with on-road mobile sources and simply call those categories area sources or mobile sources (respectively). This approach is acceptable but not preferred. If this type of integration is done for the purpose of the Summary discussion, it should be so defined.

Geographically, data should be presented on the basis of the overall designated nonattainment area and on an individual county basis. If air quality modeling will be conducted

TABLE 3-2. SUMMARY OF 1990 DEMOGRAPHIC INFORMATION FOR THE OZONEVILLE NONATTAINMENT AREA

Demographic Parameter	County A Value	County B Value	County C Value	County D Value	State Value	Reference
Population	407,497	205,259	368,314	301,077	6,412,000	1
Land Area (sq. mi.)	528	364	342	471	N/A[a]	1
Number of Households	154.355	79.868	133.932	120,915	3,695,000	1. 3
Manufacturing Employment	68,617	27,341	36,185	34,619	314,000	1. 2
Construction Employment	15,157	3,856	7,905	6,502	38,419	1, 2
Wholesale Employment	10,602	2,575	4,178	2,902	37,278	1, 2
Retail Employment	32,706	11,096	22,663	18,509	379,412	1, 2
Commercial/Institutional Employment	97,452	37,967	66,263	52,652	738,450	1, 2
Gasoline RVP	10.8	10.8	10.8	10.8	N/A	4

[a] N/A means the value of the indicated parameter was not used in the analysis and, therefore, is not applicable.

References:

1. Ozoneville Regional Planning Authority. Employment and Household Statistics and Projections - Ozoneville Metropolitan Statistical Area. Ozoneville, USA. February 1990. pages 12-27.

2. U.S. Department of Commerce. Bureau of the Census. County Business Patterns 1990 - North Carolina. Report No. CBP-90-345. 1991.

3. CENDATA. Online Information Utility of the U.S. Bureau of the Census. Dialog Information Systems. Professional Estimates of Household for Counties. July 1, 1990 - North Carolina.

4. North Carolina Department of Energy. Annual Fuel Use Summary Report - 1990. Raleigh, North Carolina. April 1991. pages 9-10.

for the nonattainment area to demonstrate how attainment will be achieved, and if the geographic modeling domain is larger than the designated nonattainment area (this will be the case for ozone nonattainment areas using the Urban Airshed Model), then emission summaries should also be presented for the total modeling domain and for the individual counties in the domain, If modeling will not be conducted for a large domain, then point source data for the 25-mile extension area should be presented. If data are presented for the 25-mile extension area, the State must be sure to clearly distinguish these emission estimates from those for the primary nonattainment area.

There are many possible ways to summarize and present the inventory emissions results. The following paragraphs identify the types of emission results that should be included in the inventory report and give examples of several methods for data display that are preferred by EPA. States are not required to use formats that precisely duplicate the following examples; however, they are encouraged to use formats that communicate the inventory results to the same extent and level of detail as in the examples.

Total Emissions for the Nonattainment Area

This documentation should define total VOC, NO_x, and CO emissions on an annual and seasonal daily basis for the designated nonattainment area. It would be appropriate to list these estimates in the text of the document and illustrate the data with a bar or pie chart, as shown in the examples in Figure 3-2 (annual emissions) and Figure 3-3 (daily emissions), For example, documentation for annual emissions might consist of the following:

Total annual ozone precursor emissions from the Ozoneville designated nonattainment area for the 1990 base year are shown below:

- ***VOC emissions = 45,600 tons/yr***
- ***NO_x emissions = 29,900 tons/yr***
- ***CO emissions = 134,770 tons/yr***

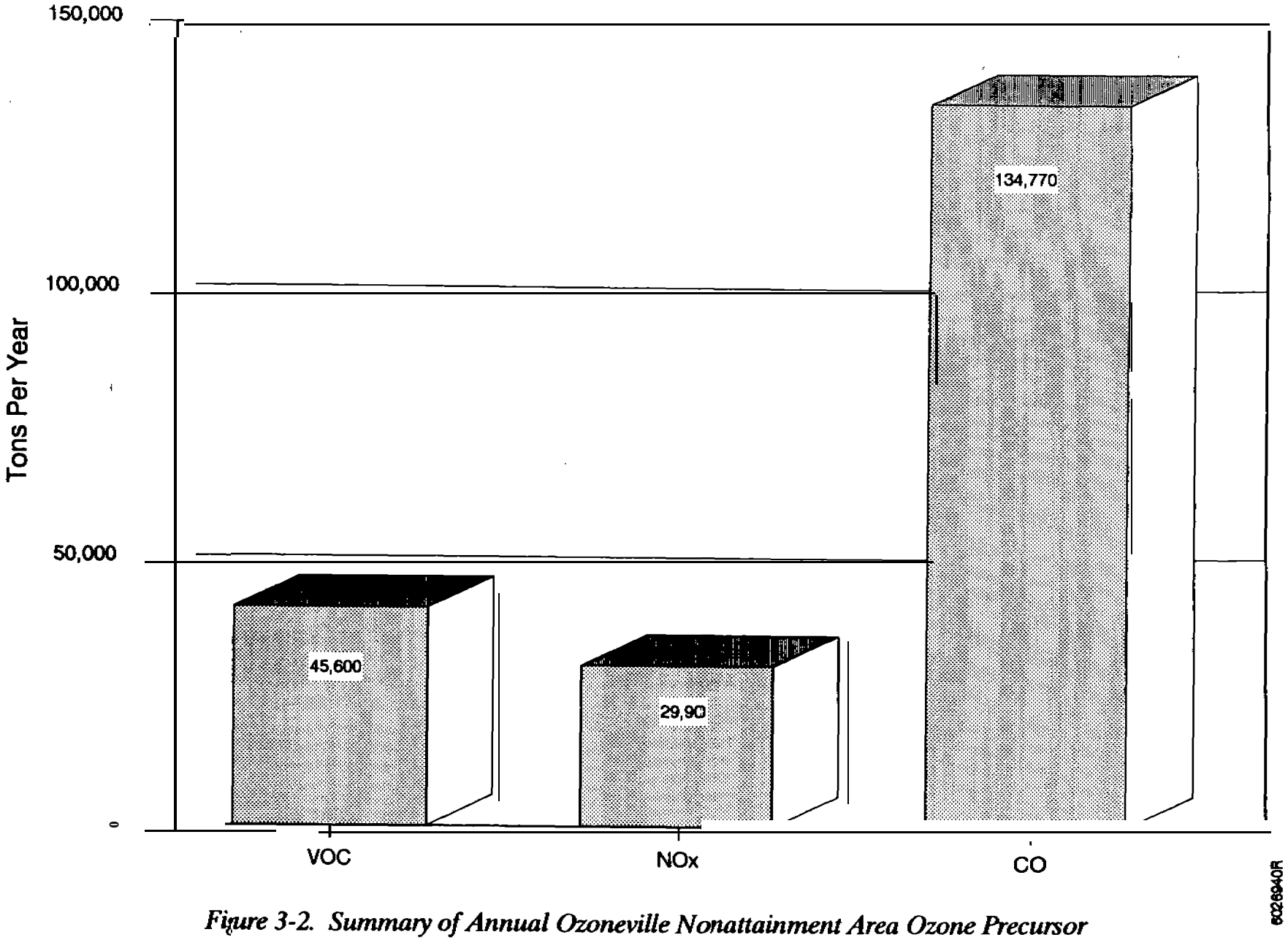


Figure 3-2. Summary of Annual Ozoneville Nonattainment Area Ozone Precursor Emissions - 1990 Base Year

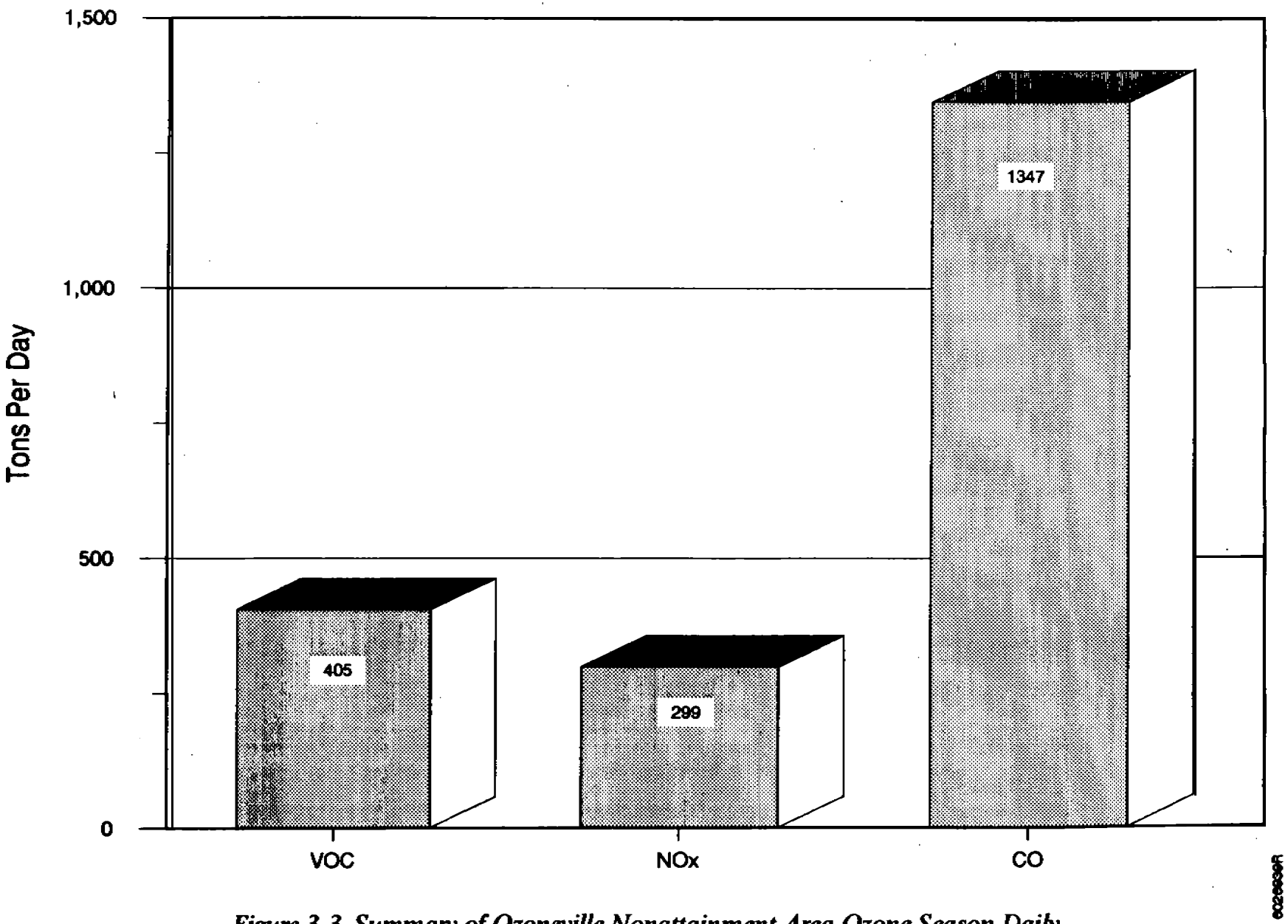


Figure 3-3. Summary of Ozoneville Nonattainment Area Ozone Season Daily Emissions - 1990 Base Year

Figure 3-2 graphically illustrates the relative magnitude of the emissions in the nonattainment area.

The same type of data presentation should also be used for daily emissions. For example:

Total average daily peak ozone season precursor emissions from the Ozoneville nonattainment area for the 1990 base year are shown below:

- *VOC emissions = 405 tons/&y*
- *NO, emissions = 299 tons/day*
- *CO emissions = 1,347 tons/day*

Daily emissions were averaged for the 3-month peak ozone season for the Ozoneville nonattainment area, which was determined as June 1 to August 31 (based on the highest ozone violations for the years 1987-1989). Figure 3-3 illustrates the relative magnitude of daily emissions from different sources for the nonattainment area.

Similarly, if the area is one that requires air quality modeling to be conducted for attainment demonstration purposes and the modeling domain is larger than the nonattainment area, emissions should also be totaled and summarized for the larger modeling domain and for individual counties in the larger domain.

Emissions Summary by County and by Pollutant

The emissions summary in the documentation report should include tables or graphs that present total annual and peak ozone season daily VOC, NO,, and CO emissions for the individual counties in the designated nonattainment area (or modeling domain area as applicable). (Note that for CO nonattainment inventories, only CO annual and daily emissions would be reported.) An example of a table for annual emissions is shown in Table 3-3. For consistency, the same format as in Table 3-3 should be used to report daily emissions. The same information can be more powerfully communicated by using a graphic such as the one shown in the example in

TABLE 3-3. ANNUAL VOC, NO_x, AND CO EMISSIONS BY COUNTY IN THE OZONEVILLE NONATTAINMENT AREA - 1990 BASE YEAR

County	Pollutant Emissions (tons/yr)		
	VOC	NO_x	CO
A	28,300	21,700	69,780
B	31,200	25,650	60,060
C	14,000	8,200	28,700
D	16,800	11,950	22,220
E	52,100	41,870	81,070
F	29,000	17,230	58,750
TOTAL	171,400	126,600	320,580

Note to Reader: If the inventory area is one that requires air quality modeling to be conducted for attainment demonstration purposes and the modeling domain is larger than the nonattainment area, emissions should also be totaled and summarized for the larger modeling domain and for individual counties in the larger domain. A similar presentation format to that shown in this table can be used for the larger modeling domain emissions summary.

Figure 3-4. These types of graphs can be used for both annual and daily emissions, and for both ozone precursor and CO emission inventories.

Emissions Summary by Source Type for the Nonattainment Area

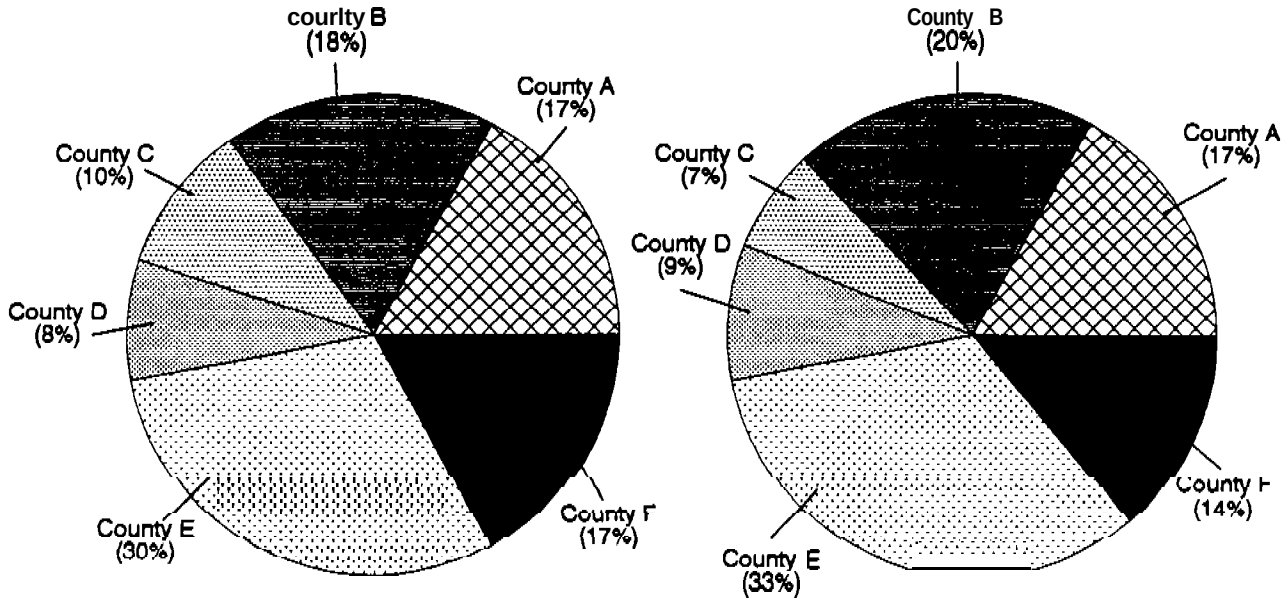
It is important to summarize emissions for the entire nonattainment area according to the five major source type categories. Data should be similarly summarized for the entire modeling domain if attainment demonstration modeling is to be conducted for a larger geographic area. As with all of the emission summaries, data need to be presented for both annual and ozone or CO season daily emissions. Table 3-4 illustrates a format that could be followed for ozone season daily emissions. The same format would be used for annual emissions. Similarly, the same type of table should be used for CO nonattainment area inventories except that only CO data would be reported. A figure such as Figure 3-5 could be used to graphically portray a daily or annual emissions summary.

Emissions Summary by Source Type and by County

It would be useful to summarize emissions for each pollutant for each individual county by major source type class. If this is done, emission summaries should be provided for both annual and seasonal daily emissions. Separate tables can be prepared for each pollutant. Annual and daily emissions of the same pollutant can be combined on the same table or split into two at the State's discretion. The example in Table 3-5 combines both annual and seasonal daily VOC emissions.

3.3 DOCUMENT ORGANIZATION

The overall organization and structure of an emission inventory report should be explained in the Background section. Each individual document component should be identified and its contents defined. An example of the type of discussion required is illustrated below.



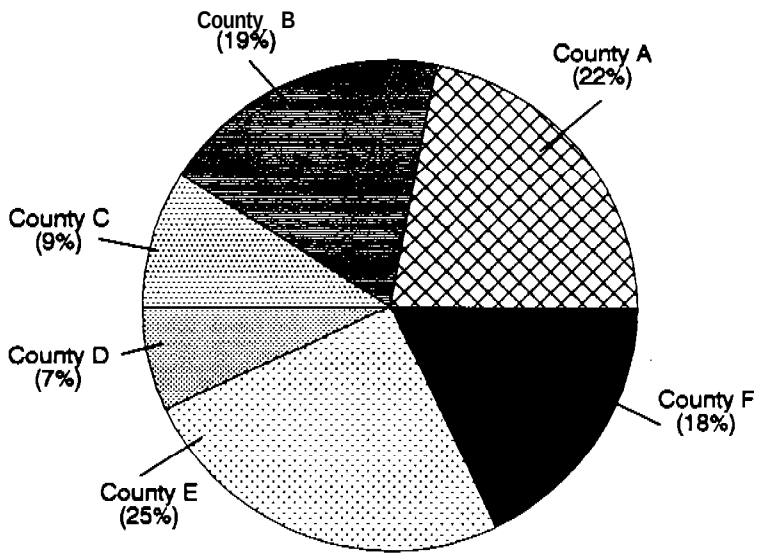


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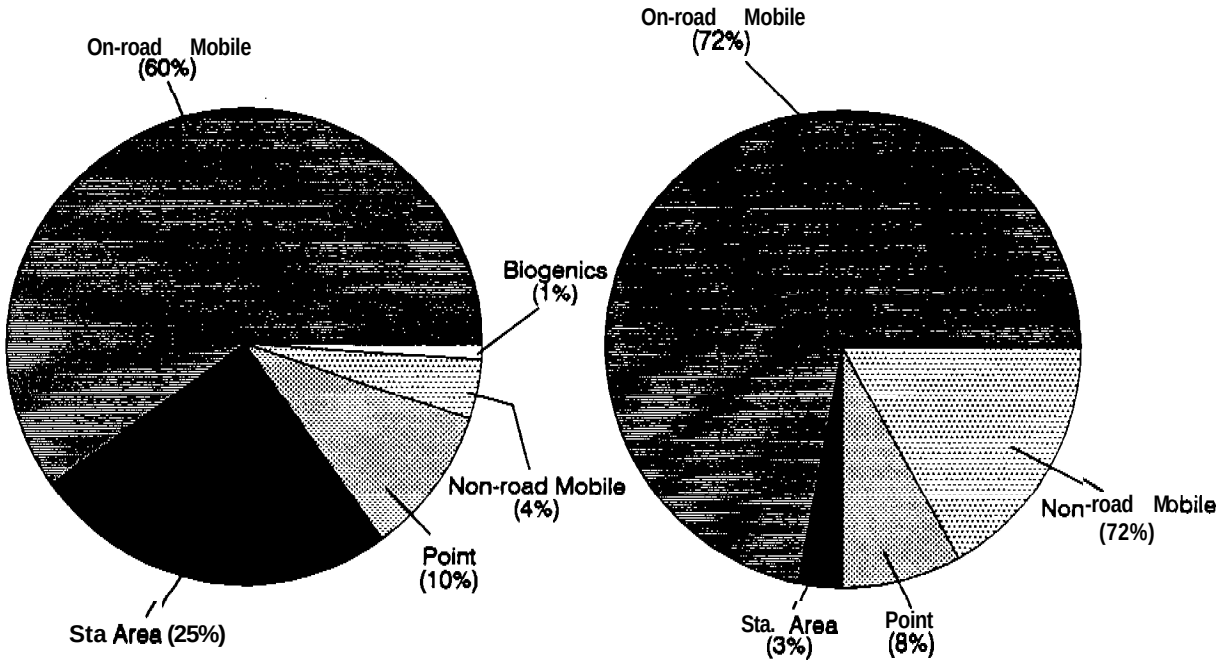
*Figure 3-4. **Distribution** of **Annual Emissions by** County for the **Ozoneville** Nonattainment Area • 1990 **Base** Year*

TABLE34 *DISTRIBUTION OF OZONEVILLE NONATTAINMENT AREA*
EMZSSIONSBYSOURCE TYPE-1990BASE YEAR

Source Type	Pollutant Emissions (tons/day)		
	VOC	NO_x	CO
Stationary point sources	42	21	57
Stationary area sources	101	11	23
Non-road mobile sources	11	37	162
On-road mobile sources	243	230	1,105
Biogenic sources	8	0	0
TOTAL	405	299	1,347

Note to the Reader: If the inventory area is one that requires air quality modeling to be conducted for attainment demonstration purposes and the modeling domain is larger than the nonattainment area, emissions should also be totaled and summarized for the larger modeling domain and for individual counties in the larger domain. A similar presentation format to that shown in this table can be used for the larger modeling domain emissions summary.



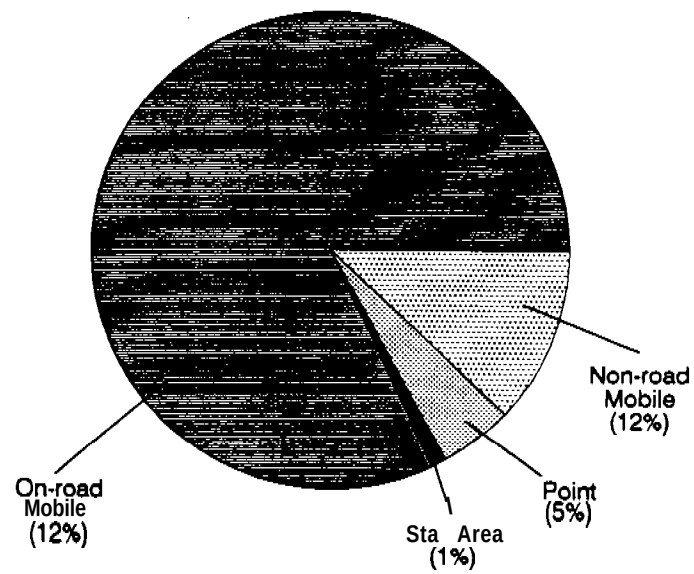


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Figure 3-5. Distribution of Daily Emissions by Source Type for the Ozoneville Nonattainment Area - 1990 Base Year

TABLE 3-5. SUMMARY OF VOC EMISSIONS IN OZONEVILLE NONATTAINMENT AREA BY COUNTY AND SOURCE TYPE - 1990 BASE YEAR

County	VOC Emissions											
	Point Sources*		Area Sources		Non-road Mobile Sources		On-road Mobile Sources		Biogenic Sources		Total	
	Seasonal Daily (tons/day)	Annual (tons/yr)	Seasonal Daily (tons/day)	Annual (tons/yr)	Seasonal Daily (tons/day)	Annual (tons/yr)	Seasonal Daily (tons/day)	Annual (tons/yr)	Seasonal Daily (tons/day)	Annual (tons/yr)	Seasonal Daily (tons/day)	Annual (tons/yr)
A	8	160	5	95	5	80	75	27,500	0.5	80	93.5	27,195
B	12	295	20	240	18	98	95	30,500	20	120	165	31,253
C	20	600	120	460	42	215	200	60,000	12	500	394	61,775
D	9	270	65	295	3	27	5	1,200	1.5	15	83.5	1,807
E	14	450	10	185	11	44	5	1,200	20	120	60	1,999
TOTAL	63	1,775	220	1,275	79	464	380	120,400	54	835	796	124,749

*Emissions figures do not include any emissions from sources in the 25-mile extension area.

Note to the Reader: If the inventory area is one that requires air quality modeling to be conductec for attainment demonstration purposes and the modeling domain is larger than the nonattainment area, emissions should also be totaled and summarized for the larger modeling domain and for individual counties in the larger domain. A similar presentation format to that shown in this table can be used for the larger modeling domain emissions summary.

The remainder of this document is organized as follows:

The description and documentation for the stationary point source component of the Ozoneville inventory is provided in Section 2.0. The supporting documentation and example calculations for the point source discussion are found in Appendix A.

Section 3.0 describes the derivation of the stationary area source inventory. Supporting documentation for emission factors and activity data are given in Appendix B.

Non-road mobile emission estimates are documented in Section 4.0, with supporting documentation and calculations found in Appendix C.

Section 5.0 addresses on-road mobile emission estimates. Detailed input and output data from the MOBILE4.1 emission factor model and from determining VMT using the State's Highway Performance Monitoring System (HPMS) database are provided in Appendix D.

Biogenic emission estimates are documented in Section 6.0.

Section 7.0 provides a description of the quality assumnce (QA) program used to ensure that the inventory contains accurate and complete data. Copies of completed QA checklists documenting errors found and how these errors were corrected are given in Appendix E. Additionally, Appendix F contains a copy of the completed inventory QA checklist from EPA's guidance document Quality Review Guidelines for 1990 Base Year Inventories (September 1991).

SECTION 4

STATIONARY POINT SOURCES

This section is intended to assist State and local agencies in documenting VOC, NO,, and CO emissions from stationary point sources. The point source section of the emission inventory report should contain an introduction, describe how the point source list was obtained and how emission estimates for individual sources were calculated, and give summary tables detailing emissions by pollutant and by source category. Each of the following subsections addresses a portion of the point source inventory and provides an example of how to document each topic.

4.1 INTRODUCTION

The introduction to the stationary point source section should be a well written narrative that briefly describes the overall process used to obtain point source emission estimates. It should identify the agency responsible for point source submittal and outline the remainder of the point source section. The following is an example introduction.

This section documents the development of the Ozoneville Nonattainment Area stationary point source list and serves to characterize the point source component of the emission inventory by describing data collection, verification, and emission estimation techniques. For the purposes of this emission inventory, point sources are defined as stationary, commercial, or industrial operations that emit more than 10 tpy VOC or 100 or more tons of NO, or CO per year. The point source inventory consists of actual emissions for the base year 1990, and includes sources in the-six Ozoneville nonattainment area counties and 100-ton VOC sources located in the 25-mile boundary zone.

The Ozoneville Air Pollution Control Agency (OAPCA) was the lead agency responsible for compiling the point source inventory. It was responsible for identifying point sources meeting the cutoff criteria, documenting the method used to calculate emissions from each source, and summarizing and presenting its findings.

The remainder of this section details the point source data collection techniques, the emission estimation procedures, and provides more detailed tiles of emission estimates.

4.2 COMPILING THE POINT SOURCE LIST

The EPA Procedures document (EPA-450/4-91-016) gives several possible resources for compiling an initial list of potential point sources, including existing inventories, state permit files, county business directories, and even telephone books. Whatever the approach, it is important that a verbal description of this activity be included in the inventory report. The following is an example of how to document this "data gathering" step.

This section describes the method used to develop the initial point source list from which point source emissions for the 1990 Ozoneville- base year inventory were estimated. This section is included in order to demonstrate that the source list is as complete as possible.

Point source data collection activities were initiated by OAPCA in February 1991, after receiving notification from EPA that the Ozoneville Nonattainment Area is a nonattainment area for ozone. An existing emission inventory, compiled for the Ozoneville 1987 SIP, formed the starting point for the point source list. The 1987 inventory identified 65 point sources emitting greater than 25 tpy of VOC, and 23 point sources emitting greater than 100 tpy of CO or NO,. Because of the tower cutoff for VOC sources required for the 1990 inventory, it was recognized that additional sources would need to be considered.

To supplement the existing point source list, county business directories, local telephone books, electronic yellow pages, and State industrial directories were consulted to identify potential sources in the source categories listed in Table 4.2-l of the EPA Procedures document (EPA-450/4-91-016). In addition, State and local lists of permitted air pollution sources were reviewed in order to adequately account for sources that have only recently begun opemtion.

The above procedures identified 16 potential VOC sources and 4 potential CO and NO, sources in addition to the sources in the i987 inventory.

Once all possible point sources have been identified, a follow-up survey should be conducted to eliminate sources that have either shut down or that have emissions less than the stated cutoff values, This can be accomplished in several ways including:

- Direct plant contact via telephone calls;
- Indirect plant contact via mail surveys;
- Plant inspections; or
- Consulting air pollution agency files.

These -methods are discussed in more detail in the EPA Procedures document (EPA-450/4-91-016). In any case, it is important to describe how the final list of point sources was obtained. An example of how this may be documented follows:

The comprehensive initial list was refined by eliminating facilities that were known to have closed and those that were found to have no local emission activities (e.g., sales offices, corporate headquarters, etc.). Each of the point sources on the initial list was contacted by telephone and administered a screening survey in order to detennine if its emission activity exceeded the 10 tpy threshold level for VOC, or the 100 tpy level for NO, or CO. Plants or facilities with annual emissions less than these cut-off levels were eliminated from the stationary point source list and are now accounted for in the area source inventory.

Based on the screening survey, plants whose emission activity exceeded the threshold level for any of the three pollutants were then sent questionnaires. The questionnaires were designed to obtain the site-specific data outlined in the EPA Procedures document (EPA-450/4-91-016). A copy of the questionnaire used for Ozoneville point source data gathering is provided in Appendix C. Follow-up telephone calls were made in several cases to clarify responses. In addition, site visits were performed at several facilities as part of the survey follow-up activities. These data verification techniques ensured a complete data set for each point source in the inventory.

Table 4-l shows the final point source list and includes the name, location, and pollutants emitted for each identified source.

***TABLE** 4-1. FINAL POINT SOURCE LIST • OZONEVILLE NONATTAINMENT AREA*

County	Plant Name	Location	Pollutants Emitted		
			VOC	NO_x	CO
A	Axon Gas	3311 Philips Highway	X	X	X
A	Waste Bakers Inc.	1262 Philips Highway	X	X	X
B	ABC Drum Works	111 Main Street	X		
C	Central Power	3746 Big Road	X	X	X
D	Bill's Paints	16 Main Street	X		
E	The Fixit Shop	8329 3rd Place	X		
F	Squeeky Clean	1919 Bridge Road	X		

4.3 DOCUMENTING THE EMISSION ESTIMATION PROCEDURES

Once a final list of point sources has been compiled, emission estimates must be determined for each source. Emission estimates for point sources must represent actual emissions for the base year 1990--permitted emission limits are not acceptable. This means that emissions from each source must be determined using source test results, material balances, or calculations that use appropriate emission factors. The method used to determine emissions should be given for each source and an example calculation included for each method employed. If applicable, rule effectiveness and seasonal adjustment should be considered for each source. The documentation for these procedures should enable the reviewing agency to follow the methodology used, and to independently reproduce the stated emission estimates. An example of acceptable documentation for emission estimates for point sources follows:

In the majority of cases, emission estimates for each point source on the final list were derived using material balance approaches. AP-42 emissions factors and source test data were

also used to calculate base year estimates. Rule effectiveness and seasonal adjustments were included in the emission estimates for applicable source categories. The following equation was used to account for rule effectiveness and seasonal adjustment:

$$E_s = \frac{E_A \cdot T_s}{D \cdot W_s} \left[1 - C_e\ (RE)\right]$$

where:

E_S = *Seasonally adjusted emissions (lb/day)*

E_A = *Annual emissions of VOC, NO„ or CO (lb/year)*

T_S = *Throughput for ozone (or CO) season, as a fraction of annual throughput*

D = *Days in operation per week (days/week)*

W_S = *Weeks of ozone (or CO) season (weeks per year)*

C_e = *Control efficiency*

RE = *Rule effectiveness*

At this point, the inventory report should provide examples of how emissions from the point sources on the fmal list were calculated. The calculations in the examples should incorporate rule effectiveness and seasonal adjustment. The examples can be documented as follows:

The following examples show how emission estimates were obtained for the point sources on the final list.

Examvle 1

Squeeky Clean
1919 Bridge Road-
Ozoneville, USA

General Facility Information:

Squeeky Clean is a commercial dry cleaning facility that employs 35 people and operates six days per week in County A. The facility uses perchloroethylene as a cleaning solvent and reportedly cleaned 625 tons of clothing in 1990. The amount of perchloroethylene purchased in 1990 was 150,340 pounds. Assuming that all of the solvent purchased during 1990 was lost to the atmosphere through evaporation, and because perchloroethylene is considered reactive, the emissions from this facility were estimated to be 150,340 pounds of reactive VOC. Because the reported cleaning activity for this facility stayed essentially constant throughout the year, no seasonal adjustment was applied (Le., $T_s = .25$). This facility is not subject to air emission regulations and is uncontrolled, so no rule effectiveness factor was applied.

Calculations:

$$E_S = \frac{E_A \cdot T_S}{D \cdot W_S}\left(1 - C_e\,(RE)\right)$$

$$E_S = \frac{(150{,}340\ lb/yr) \cdot (.25)}{6\left(\frac{days}{week}\right) \cdot 13\left(\frac{weeks}{yr}\right)}$$

$$E_S = 481.9\ \frac{\text{lb } VOC}{ozone\ day}$$

Example 2

Specialty Packaging
1934 Cottonwood Drive
Ozoneville, USA

General Facility Information:

Specialty Packaging is a manufacturer of printed flexible packaging material located in County B. The printing method is jlexogmphy using alcohol-base inks. The company operates three printing lines. VOC emissions occur from solvent contained in the ink and solvents used for equipment clean-up. Each of the potential emission points along the printing lines is controlled by a vapor capture system combined with a carbon bed adsorption/solvent recovery control system. A rule effectiveness factor of 80 percent was applied to account for variations in control efficiency over time. The following information for the 1990 base year was provided by Specialty Packaging and was based on material balances:

- *Total ink consumption in 1990 = 35,000 gallons;*
- *Total clean-up solvent consumption in 1990 = 5,000 gallons;*
- *Total quantity of VOC vented to the carbon adsorption system in 1990 = 193,750 lbs/yr;*
- *Solvent recovery system measured efficiency in 1990 = 75% (. 75 lb recovered/lb captured);*
- *Employees = 22; and*
- *Operating time = 5 days per week, 52 weeks per year.*

Calculations:

$$E_S = \frac{E_A \cdot T_S}{D \cdot W_S}\left(1 - C_e\,(RE)\right)$$

$$E_S = \frac{(193{,}750\ lb/yr) \cdot [1-(0.75)\quad\quad (0.80)]}{5\left[\frac{days}{week}\right] \cdot 13\left[\frac{weeks}{yr}\right]}$$

$$E_S = 298\ \frac{lb\ VOC}{ozone\ day}$$

Example 3

Central Power
3746 Big Road
Ozoneville, USA

General Facility Information:

Central Power operates a base-load steam electric generating plant with seven coal-fired boilers in County C. Stack tests conducted on the boiler in March 1990 indicated NO, and VOC emissions of 4,118.6 and 18.1 pound per hour, respectively, and that 70% (12.6 lb/hr) of the VOCs emitted from these boilers was reactive. During the emissions test, coal consumption was reported as 95 tons/hr (2280 tons/day). The plant continuously operates at maximum generating capacity, so no seasonal or weekday adjustments were applied.*

Calculations:

$$NO_x = \frac{4{,}118.6\ lb}{hr} \times \frac{24\ hr}{ozone\ day} = \frac{98{,}846.4\ lb}{ozone\ day}$$

$$VOC = \frac{12.6\ lb}{hr} \times \frac{24\ hr}{ozone\ day} = \frac{302\ lb}{ozone\ day}$$

$$CO = \frac{2{,}280\ tons\ coal}{day} \times \frac{5\ lb\ CO}{ton\ coal} = \frac{11{,}400\ lb\ CO}{ozone\ day}$$

* *This activity level was combined with an AP-42 emission factor for coal (5 lb CO/ton coal) to determine CO emissions.*

4.4 EMISSIONS SUMMARY TABLES

The ultimate products of a point source inventory are the actual point source emissions estimates. Therefore, it is important that estimates be provided in an easy-to-read format.

Total emission estimates should be presented in a table such as the one shown in the example in Table 4-2, which gives total point source emission estimates for VOC, NO,, and CO from the six counties located in the Ozoneville nonattainment area.

Summary tables of emissions estimates by pollutant, by plant, and by each source category should also be included. The EPA's AIRS Facility Subsystem (AFS) and the SIP Air Pollutant Inventory Management System (SAMS) contain several preformatted summary reports that may be used, such as the "Detailed Point Source EMISSION Reports" in SAMS, the AFP644 "AFS Plant Emissions Inventory" report, the AFP649 "Emissions Point Summary" in AFS, and the AFP634 "Emission Ranking for a Pollutant" in AFS. Sample reports from AIRS of these formats are shown in Appendix A. States may create their own summary tables, such as those shown in the examples in Tables 4-3 through 4-5.

4.5 AIRS/AFS POINT SOURCE SUBMITTAL

A!! point source data must eventually reside in EPA's AFS. States may enter their point source data by either:

- Using the SAMS systems "Create AFS export file," available in SAMS version 4.1;
- Entering the data directly into AFS on-line; or
- Submitting an AFS-formatted transaction file directly to EPA.

The method used to transfer the data must be documented in the emissions inventory report as in the following example:

*TABLE 4-2. TOTAL ANNUAL VOC, NO,, AND CO EMISSIONS FROM POINT SOURCES FOR COUNTIES IN THE OZONEVILLE **NONATTAINMENT** AREA - 1990 BASE YEAR*

County	Pollutant Emissions (tons/yr)		
	VOC	NO_x	CO
A	25,ooo	22,000	71,000
B	30,000	28,000	62,000
C	14,000	7,000	29.000
D	16,000	12,000	22,000
E	50,000	43,000	78,000
F	28,000	18,000	60,000
TOTALS	163.000	130.000	322.000

*TABLE 4-3. SUMMARY LISTING OF VOC SOURCES INCLUDED IN THE OZONEVILLE **NONATTAINMENT** AREA INVENTORY*

Plant Name	County	1990 Emissions (tons/yr)	1990 Ozone Season Emissions (lbs/day)
Axon Gas	A	1,400	8,000
Waste Bakers, Inc.	A	10	74
ABC Drum Works	B	20	155
Central Power	C	18	141
Bill's Paints	D	24	210
The Fixit Shop	E	437	3,361
Squeeky Clean	F	22	193
TOTALS		1.931	12.084

TABLE 4-4. *SUMMARY OF* ***OZONEVILLE NONATTAINMENT*** *AREA POINT SOURCE VOC EMISSIONS BY MAJOR* ***SOURCE*** *CATEGORIES*

Category	1990 Emissions (tons/yr)	1990 Ozone Season Emissions (tons/day)
Storage, transportation and marketing of VOC	1,400	4.0
Industrial processes	437	2.0
Non-industrial surface coating	24	0.3
Other solvent use	42	0.5
Waste disposal	10	0.1
Other miscellaneous sources	18	0 . 1
TOTALS	1.931	7.0

TABLE 4-5. SUMMARY OF NO, AND CO POINT SOURCES INCLUDED IN HE OZONEVILLE ***NONATTAINMENT*** *AREA INVENTORY*

Plant/Facility Name	1990 NO_x Emissions (tons/yr)	1990 Ozone Season NO_x Emissions (lbs/day)	1990 CO Emissions (tons/yr)	1990 Ozone Season CO Emissions (lbs/day)
Central Power	18,040	98,856	2,081	11,400
Waste Bakers, Inc.	1,145	7,200	700	4,400
Axon Gas	2,029	11,119	1,051	5,760
TOTALS	21,214	117,175	3,832	21,560

EPA's SAMS was used to compile the stationary point source inventory and prepare the data for SIP submittal. After running the point source data through the "AFS Edit Checks" subroutine, an AFS compatible output file was created using the SAMS utility "Create AFS export file." This file was copied onto a floppy disc and submitted to Bill Shoe at the Region 4 office. A copy of the SAMS backup disc containing all the point source data is included in this inventory to aid the reviewing agency.

4.6 REQUIRED INFORMATION FOR POINT SOURCES

A minimum amount of information about each stationary point source must be included in the emissions inventory report. A list of the required data is shown in Chapter 4 of the EPA Requirements documents (EPA-450/4-91-010 and EPA-450/4-91-011).

There are several ways States can satisfy this requirement. Once all the point source information has been uploaded to AFS, a customized summary report may be created that lists the required data for each plant. Another option is to use a SAMS Detailed Point Source Information report for each plant in the inventory. An example of a SAMS Detailed Point Source Information report containing all of the required data for a single point source is shown in Table 4-6.

Point source data should be submitted as an appendix to the main inventory report because, in many cases, hard copies of this information are several inches thick.

TABLE 4-6. DETAILED POINT SOURCE LISTING

SAMS Report. Date: 02/12/92 Page l-l

PLANT INFORMATION

Plant Name: CENTRAL DRUM WORKS Type of Inventory: 3 Last Updated by: MOP on 02/12/92
Total Plant VOC Annual Emissions: 51 tons/yr Total Plant VOC Ozone Season Daily Emissions: 60 lbs/day
Total Plant NOX Annual Emissions: 0 tonslyr Total Plant NOX Ozone Season Daily Emissions: 0 lbs/day
Total Plant CO Annual Emissions: 0 tons/yr Total Plant CO Ozone Season Daily Emissions: 0 lbs/day
Total Plant CO CO Season Emissions: 0 lbs/day
State: North Carolina County: Mecklenburg Co AQCR: 235
NEDS Plant ID: 0899 CDS Plant ID: Local Plant ID:
Street Address: 101 MAIN ST. City: JONESVILLE Zip Code: 22720
City Code: UTM Zone: 17 UTM Easting: 500.0 UTM Northing: 4000.0
Township/Modeling Grid Code:
SIC Codes - Primary: 3479 Secondary: Tertiary:
Principal Product: STEEL DRUM Employees: 54 Plant Area: 0.0 acres
Plant Contact: BILL JOHNSON Telephone Number: (770) 456-8787
Plant Level Comment: RECONDITIONING OF STEEL DRUMS

POINT INFORMATION

Point ID: 05 Local Point ID: *SIC: 3479* Last Updated by: MOP on 02/12/92
Total Point VOC Annual Emissions: 51 tons/yr Total Point VOC Ozone Season Daily Emissions: 60 lbs/day
Total Point NOX Annual Emissions: 0 tonslyr Total Point NOX Ozone Season Daily Emissions: 0 lbs/day
Total Point CO Annual Emissions: 0 tons/yr Total Point CO Ozone Season Daily Emissions: 0 lbs/day
Total Point CO CO Season Emissions: 0 lbs/day
UTM Easting: 500.0 UTM Northing: 4000.0 Latitude: 35-06-05 Longitude: 080-41-50
Operating Schedule - Hours per day: 9 Days per week: 5 Weeks per year: 52
Start time: 07:00 Ending time: 16:00
Throughputs - December through February: 25 March through May: 25
June through August: 25 September through November: 25
Stack Parameters - Height: 0 Diameter: 0.0 Temperature: 0 Plume Rise: 0
Flowrate: 0 Exit Velocity: 0.0 Points with Common Stack:
AFS Stack: 011 Boiler Capacity: 0 Space Heat Percentage: 0.0
Point Level Comment: INTERIOR LINING LINE

(Continued)

TABLE 4-6. (Continued)

POINT MISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS — Last Updated by: MOP on 02/12/92
Primary Control Device: PROCESS CHANGE
Secondary Control Device: NO EQUIPMENT
Control Device Efficiency: 90.0%
Measured Emissions: 0 Units: TY Method of Emissions Measurement: 1
Estimated Emissions: 45 Estimation Method: MATERIAL BALANCE
Emissions Summed from Process: 45 tons/year 980 lbs/day 0 lbs/day
SIP Regulation in Place (Y/N)? Y Compliance Year: 90 Emission Limitation: 226 TPY
SIP Emission Limitation: 0 SIP Emission Limitation Units: TY
Point Emissions Level Comment: INTERIOR LINING LINE

PROCESS INFORMATION

SCC Number: 3-09-060-01 SCC Sequence Number: 01 — Last Updated by: MOP on 02/12/92
SCC Description: Fabricated Metal Products/Fabricated Metal Products/Porcelain Enamel/Ceramic/Spray Booth
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content: 0
Confidentiality: Available for public review
AFS Segment: 01 Process Rate Units: Gallons Wet Mixed Slurry Sprayed
Actual Annual Process Rate: 5265 Maximum Design Rate: 2.300
03 Season Daily Process Rate: 20.7 CO Season Daily Process Rate: 20.7
Process Level Comment: INTERIOR LINING LINE

TABLE 4-6. (Continued)

SAMS Report Date: 02/12/92 Page 1-2

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: MOP on 02/07/92
Primary Control Device: FLARING
Secondary Control Device: FLARING
Control Device Efficiency: 90.0%
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:
SIP Emission Limitation: SIP Emission Limitation Units:
Estimation Method: CALC USING SPECIAL EMISSION FACTOR OTHER THAN SCC Emission Factor: 5
Annual Nonbanked Emissions: 1 tons psr year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: Rule Effectiveness: N/A
03 Season Daily Emissions: 10 lbs CO Season Daily Emissions: lbs
Process Emissions Level Comment:

PROCESS INFORMATION

SCC Number: 4-02-026-06 SCC Sequence Number: 01 Last Updated by: MOP on 02/07/92
SCC Description: Surface Coating Operation/Surface Coating Operation/Surface Coating of Steel/Interior Coating
Type of Source: Process Percent Sulfur: 0.0 Percent Ash: 0.0 Heat Content: 0
Confidentiality: Not available for public review
AFS Segment: 02 Process Rats Units: Gallons Paint Consumed
Actual Annual Process Rate: 15795 Maximum Design Rat%: 6.750
03 Season Daily Process Rate: 60.75 CO Season Daily Process Rate: 60.75
Process Level Comment: INTERIOR LINING LINE

PROCESS EMISSIONS INFORMATION

Pollutant: VOLATILE ORGANIC COMPOUNDS Last Updated by: MOP on 02/07/92
Primary Control Device: FLARING
Secondary Control Device: FLARING
Control Device Efficiency: 90.0%
SIP Regulation in Place (Y/N)? N Compliance Year: Emission Limitation:
SIP Emission Limitation: SIP Emission Limitation Units:
Estimation Method: STACK TEST RESULTS OR OTHER EMISSION MEASUREMENT Emission Factor:
Annual Nonbanked Emissions: 50 tons per year Annual Banked Emissions: tons per year
Seasonal Adjustment Factor: Rule Effectiveness: N/A
03 Season Daily Emissions: 50 lbs CO Season Daily Emissions: lbs
Process Emissions Level Comment:

(Continued)

TABLE 4-6. (Continued)

PROCESS PROJECTION EMISSIONS INFORMATION

Projection Year: 93 Projection Year Attainment Year (Y/N)? Last Updated by: MOP on 02/12/92
Primary Control Device: FLARING
Secondary Control Device: FLARING
Control Device Efficiency: 90.0% Growth Factor:
03 Season Daily Base Line Emissions: lbs CO Season Daily Base Line Emissions: lbs
SIP Regulation in Place (Y/N)? Compliance Year: Emission Limitation:
Updated Primary Control Device: FLARING
Updated Secondary Control Device: FLARING
Control Device Efficiency: 90.0% Rule Effectiveness: 80
03 Season Daily SIP Strategy Emissions: lbs CO Season SIP Strategy Daily Emissions: lbs
Process Projection Emissions Level Comment:

SAMS Report Date: 02/12/92 SUMMARY

Grand Total VOC Annual Emissions:	51 tons/yr	Grand Total VOC Ozone Season Daily Emissions:	60 lbs/day
Grand Total NOX Annual Emissions:	0 tons/yr	Grand Total NOX Ozone Season Daily Emissions:	0 lbs/day
Grand Total CO Annual Emissions:	0 tons/yr	Grand Total CO Ozone Season Daily Emissions:	0 lbs/day
Grand Total CO CO Season Emissions:	0 lbs/day		

SECTION 5

STATIONARY AREA SOURCES

This section of the guidance document shows how VOC, NO_x, and CO emissions from stationary area sources may be documented in the emission inventory report. The guidance is presented mainly in the form of examples. A diverse set of processes (e.g., industrial evaporative loss sources, combustion sources, non-industrial evaporative loss sources, etc.) are addressed for the following area source categories:

- Gasoline distribution losses;
- Dry cleaning;
- Graphic arts;
- Cutback asphalt paving;
- Pesticides application;
- Commercial/consumer solvent use;
- Orchard heaters; and
- Woodstoves.

A State or local agency's inventory documentation should address each distinct area source category in a separate section or discussion. Each discussion needs to clearly delineate the estimation method used; the emission factor used and its source; the activity data level used and its source; whether rule effectiveness was applicable and, if so, what effectiveness was used and why; and how emissions were seasonally adjusted to a daily basis.

Section 5.1 contains guidance on how an introduction to the area sources documentation should be structured. Section 5.2 provides an example discussion for summarizing total area source emissions. Sections 5.3 through 5.10 present example documentation for selected area source categories. The categories were chosen to represent a variety of different source types, each presenting its own issues. The examples shown here are intended to only offer suggestions

for how to document area source values and do not define totally prescriptive formats that must be followed. However, the examples do define the minimum data elements that must be clearly communicated to EPA as a part of any documentation effort.

5.1 INTRODUCTION

The primary purpose of the introduction is to delineate the area source categories addressed (and not addressed) in the inventory and to identify any special assumptions or conditions (e.g., emission factors used, activity data used, rule effectiveness use, subtraction of point sources etc.) that influenced the emission estimates. An example of a discussion that could be used to define source category coverage is given below.

Identification of Source Categories Inventoried

All of the area source categories contained in the EPA Procedures document (EPA-450/4-91-016) were evaluated for emission estimates for the Ozoneville Nonattainment Area emissions inventory, with the following exceptions.

County A: Emulsified asphalt and orchard heaters

County B: Emulsified asphalt, orchard heaters, and agricultural burning

County C: Orchard heaters and agricultural burning

AU Counties: Open burning, natural gas well blowouts, silage storage, and all the small-scale combustion sources (e.g., backyard grills, deep fat fryers, etc.)

Open burning was not included for any county because open burning is prohibited by law in all counties. Orchard heaters were not included in Counties A, B, and C because there are no fruit crops in these counties and no other crops were found to use heating, particularly during the ozone season. Emulsified asphalt use was omitted from Counties A and B because the Ozoneville Highway Department indicated that this form of paving was not used in either county. Agricultural burning was excluded for Counties B and C because there is no

commercial agriculture in these counties and the County Farm Extension Service knew of no burning practices.

Several of the area source categories contained in the latest EPA Procedures document under the heading of Previously Uninventoried Source Categories were not included in the Ozoneville Nonattainment Area emissions inventoty. Natural gas well blowouts were excluded because there are no natural gas wells in any of the counties. Silage stomge was excluded for the same reason. None of the small-scale combustion sources identified in the EPA Procedures document were addressed in the inventory because no suitable emission factors were available for estimation purposes, activity data were very difficult and expensive to obtain, and the categories were determined to be negligible contributors to emissions.

Area source emission estimates were genemlly calculated using the recommended guidance in the EPA Procedures document. Exceptions to the recommended approaches are detailed in the individual source category discussions. A summary of area source emissions for the entire Ozoneville nonattainment area and for individual counties is provided in Section 5.2.

5.2 EMISSIONS SUMMARY

The area source documentation should contain summary tables that report area source category emissions for the entire nonattainment area and for individual counties within the nonattainment area. Emissions should be reported on both an annual and an ozone or CO season daily basis. Table 5-l illustrates an acceptable format for total area emissions and Table 5-2 shows summary numbers for an individual county. Examples of AMS-PC summary emissions reports are given in Appendix B.

5.3 EMISSIONS FROM GASOLINE DISTRIBUTION LOSSES

Emissions of VOC from gasoline distribution losses are estimated from information on gasoline throughput and tank fill methods. Gasoline throughput is determined using population data and State gasoline use information.

TABLE 5-i. SUMMARY OF EMISSIONS FROM AREA SOURCES FOR THE ***OZONEVILLE NONATTAINMENT*** *AREA*

	VOC Emissions		NO_x Emissions		CO Emissions	
	tons/yr	tons/day	tons/yr	tons/day	tons/yr	tons/day
Gasoline and Diesel Marketing						
Gasoline	2,381.00	6.91	NA[a]	NA	NA	NA
Diesel	0.36	0.001	NA	NA	NA	NA
SUBCATEGORY TOTAL	2,381.36	6.91	NA	NA	NA	NA
Stationary Source Solvent Evaporation						
Dry cleaning	349.58	1.31	NA	NA	NA	NA
Degreasing	1,063.08	3.18	NA	NA	NA	NA
Automobile refinishing	613.13	2.53	NA	NA	NA	NA
Architectural type	1,416.90	4.97	NA	NA	NA	NA
Graphic arts	186.44	0.58	NA	NA	NA	NA
Cutback asphalt paving	35.98	0.14	NA	NA	NA	NA
Roofing	41.92	0.16	0.20	0.0008	0.06	0.0002
Pesticides	40.34	0.16	NA	NA	NA	NA
Commercial/consumer solvent use	1,491.52	4.05	NA	NA	NA	NA
SUBTOTAL	5,295.76	17.08	0.20	0.0008	0.06	0.0002
Less Point Source Contribution[b]	36.0	0.13	0	0	0	0
SUBCATEGORY TOTAL	5,259.76	16.95	0.20	0.0008	0.06	0.0002

jes/sip

TABLE 5-1. (Continued)

Source	VOC Emissions		NO_x Emissions		CO Emissions	
	tons/yr	tons/day	tons/yr	tons/day	tons/yr	tons/day
Waste Management Practices						
Publicly-owned treatment works	67 0	0.45	NA	A	NA	NA
Industrial Wastewater	0 3	0.000	NA	A	NA	NA
Hazardous waste treatment, stor and disp	38 1	0.37	NA	A	NA	NA
Municipal Landfills	18 0	0.32	NA	A	NA	NA
SUBCATEGORY TOTAL	425.04	1.14	NA	NA	NA	NA
Small Fossil and Other Fuel Combustion						
Commercial/institutional	47.59	0.02	301.96	0.47	409.68	0.11
Industrial	41.89	0.11	1,214.96	3.25	432.25	1.17
Residential	3.059.85	0.03	1.058.43	0.55	20.027.12	0.12
SUBCATEGORY TOTAL	3,149.33	0.16	2.575.35	4.27	20.874.10	.40
Other						
Commercial bakeries	133.54	0.42	NA	NA	NA	NA
Miscellaneous combustion	115.37	0.30	41.58	0.10	1,848.11	4.96
Leaking underground storage tanks	150.95	0.40	NA	NA	NA	NA
SUBCATEGORY TOTAL	399.86	1.12	41.58	0.10	1,848.11	4.96

TABLE 5-1. (Continued)

	VOC Emissions		NO_x Emissions		CO Emissions	
	tons/yr	tons/day	tons/yr	tons/day	tons/yr	tons/day
Nonhighway Mobile Sources						
Aircraft	1,557.29	4.18	2,343.25	6.28	$900.76	16.31
Marine vessels	749.50	3.04	27.0	0.11	2,738.7	11.10
Other -- construction equipment	584.1	2.10	3,752.10	13.49	8,393.4	30.17
Other -- farm equipment	48.49	0.20	93.64	0.39	656.57	2.65
Other -- industrial equipment	167.3	0.45	590.5	1.58	4,684.2	12.52
Other -- lawn and garden equipment	261.9	0.93	24.4	0.08	2,322.5	8.12
Other -- motorcycles	34.7	0.11	2.2	0.01	117.3	0.37
Railroad locomotives	135.01	0.36	542.98	1.45	190.4	0.51
SUBCATEGORY TOTAL	3,538.29	11.37	7,376.07	23.39	25,093.83	81.75
TOTAL FOR AREA SOURCES	15,153.64	37.65	9,993.20	27.76	47,816.1	88.11

[a] Not applicable to this source.
[b] Point source contribution is from degreasing.

jes/sip

*TABLE 5-2. AREA SOURCE **EMISSIONS** SUMMARY FOR **COUNTY** A*

Emission Category	VOC		CO		NO_x	
	(tons/yr)	(tons/day)	(tons/yr)	(tons/day)	(tons/yr)	(tons/day)
EVAPORATIVE LOSS						
Gas Distribution						
Tank truck unloading	126	0.344	--	--	--	
Vehicle refueling	229	0.627	--	--	--	--
Tank breathing losses	14	0.039	--	--		--
Tank trucks in transit	2	0.005		--	--	
Aircraft refueling	29	0.079	--		--	
Stationary Source Solvent Evaporation						
Dry cleaning						
Perchloroethylene	38	0.103	--	--		--
Petroleum	11	0.030	--	--		
Other	0	0.000	--	--	--	--
Degreasing						
Cold cleaning	96	0.263	--	--	--	--
Surface coating						
Architectural	123	0.338	--	--	--	--
Auto refinishing	8	0.028	--	--	--	--
Traffic paints	116	0.319	--	--	--	--

TABLE 5-2. (Continued)

Emission Category	VOC		CO		NO_x	
	(tons/yr)	(tons/day)	(tons/yr)	(tons/day)	(tons/yr)	(tons/day)
EVAPORATIVE LOSS (Continued)						
Graphic arts						
All processes combined	23	0.063	--	--		--
Cutback asphalt paving	16	0.044	--	--	--	--
Asphalt kettle	4	0.000	--	--	--	--
Pesticide applications	10	0.027	--	--	--	--
Commercial/Consumer solvent use	189	0.518	--	--	--	--
Barge, tank, tank truck, rail car, drum cleaning	41	0.112	--	--	--	--
Leaking underground storage **tanks**	19	0.054				
Waste management practices						
Municipal wastewater treatment	40	0.110	--	--	--	
Industrial wastewater treatment	220	0.604	--	--	--	--
TSDFs	116	0.317	--	--	--	--
Landfills	94	0.258	--	--	--	--
Catastrophic/Accidental Releases	3	0.007	--	--	--	--

TABLE 5-2. (Continued)

Emission Category	VOC		CO		NO_x	
	(tons/yr)	(tons/day)	(tons/yr)	(tons/day)	(tons/yr)	(tons/day)
COMBUSTION						
Stationary Fossil Fuel Use						
Coal	71	0.195	641	1.757	21	0.058
Fuel oil	3	0.000	13	0.009	32	0.087
Natural gas	11	0.005	6	0.046	17	0.193
Liquid propane gas LP	2	0.000	3	0.004	2	0.018
Residential wood use	3	0.008	22	0.059	1	0.003
Solid Waste Incineration						
On-site incineration	28	0.773	79	2.192	28	0.773
Other Combustion Sources						
Forest fires	2	0.027	8	0.162	0.5	0.004
Slash/Prescribed burning	1	0.002	5	0.062	2	0.021
Agricultural burning	0.5	0.001	1	0.002	0.5	0.001
Structure fires	2	0.023	7	0.125	5	0.003

Tank fill methods may be determined by surveying a percentage of the service stations in a county. The method used to fill gasoline tanks affects the amount of VOC emitted, so that the amount of gasoline delivered using each tank fill method must be determined. Emission factors for each tank fill method are then used with the total amount of gasoline distributed by each method to determine total VOC emissions for each method.

Once emissions are calculated for each tank fill method, total VOC emissions can be determined. Rule efficiency and ozone season activity are applied to the county's total VOC emissions to estimate total VOC emitted per ozone season day.

The following example shows how the procedure for estimating emissions of VOC from Stage I tank truck unloading in one county may be documented. Note that this is only one part of gasoline distribution losses. Both rule penetration and rule effectiveness are illustrated in this example. Rule penetration is not explicitly mentioned, but is implicit in the determination of the number of service stations using different tank fill methods.

Procedure for Estimating VOC Emissions from Tank Truck Unloading in County A

Statewide gasoline consumption date for 1990 were available from the State Commerce Department, but the data were not apportioned to the county level. Gasoline consumption data have also been compiled by the State Petroleum Marketers Association, based on 1989 State gasoline data, population, number of registered vehicles, and number of service stations in the county. Although this compilation may yield the best estimate of gasoline use, it may overestimate tank unloading losses. Therefore, in this emission inventory, the number of registered vehicles in the county was used along with the 1990 estimate of gasoline consumption to calculate the amount of gas unloaded to tanks in County A.

There were a total of 5,548,562 registered vehicles in the State in 1990, of which 197,236 were registered in County A. In 1990, statewide gasoline consumption was 3.32 x 10^9 gallons. Gasoline throughput was calculated as follows:

$$\text{County A 1990 gasoline throughput} = (3.32 \times 10^9)\left(\frac{197{,}236}{5{,}548{,}562}\right)$$

$$= 118 \times 10^6 \text{ gallons}$$

A survey of service stations was conducted to determine the percentage of splash fill, submerge fill, and vapor balanced systems in County A. The survey attempted to contact 79 (24%) of the 330 service stations in County A; 42 stations were successfully contacted. On the assumption that the percentage of each tank filling method used by survey respondents was representative of all service stations in County A, 47percent of service stations in the county use the splash fill method, 36percent use the submerge fill method, and 17percent use the vapor balanced method.

To determine the amount of gasoline delivered using each tank fill method, the total amount of gasoline used in County A was multiplied by the percentage of stations using each tank fill method, as shown in the following sample calculation:

$$\text{Amount of gasoline loaded using splashfill method} = (118 \times 10^6)\ (0.47)$$

$$= 55.46 \times 10^6 \text{ gallons}$$

The amount of gasoline delivered in 1990 in County A for each tank fill method is shown below:

Tank Fill Method	Gasoline Delivered
Splash Fill	55.46×10^6 gallons
Submerge Fill	42.48×10^6 gallons
Vapor Balanced	20.06×10^6 gallons

Emission factors for each tank fill method were obtained from Comvilation of Air Pollution Emission Factors, AP-42.

It was assumed that the percentage of service stations using a particular fill method corresponded with the percentage of the total gasoline throughput loaded in that manner.

Emissions were estimated as shown below and total emissions were estimated by adding the emissions from each ***tank fill*** *method used within the county.*

Emissions from Splash Fill Method

$$= \left(\begin{matrix}\textit{Percent of}\\ \textit{stations using}\\ \textit{method}\end{matrix}\right)\left(\begin{matrix}\textit{County}\\ \textit{throughput}\end{matrix}\right)\textit{(Emission factor)}$$

$$= (.47)\ (118 \times 10^6\ gal)\left(\frac{11.5\ lb\ VOC}{1{,}000\ gal}\right)\left(\frac{1\ ton}{2{,}000\ lb}\right)$$

$$= 318.9\ \textit{tons/yr VOC}$$

Emissions from Submerge Fill Method

$$= \left(\begin{matrix}\textit{Percent of}\\ \textit{stations using}\\ \textit{method}\end{matrix}\right)\left(\begin{matrix}\textit{County}\\ \textit{throughput}\end{matrix}\right)\textit{(Emission factor)}\left(\frac{1\ ton}{2{,}000\ lb}\right)$$

$$= (.36)\ (118 \times 10^6\ gal)\left(\frac{7.3\ lb\ VOC}{1{,}000\ gal}\right)\left(\frac{1\ ton}{2{,}000\ lb}\right)$$

$$= 155.1\ \textit{tons/yr voc}$$

Emissions from Vapor Balanced Method

$$= \left(\begin{matrix}\textit{Percent of}\\ \textit{stations using}\\ \textit{method}\end{matrix}\right)\left(\begin{matrix}\textit{County}\\ \textit{throughput}\end{matrix}\right)\left(\begin{matrix}\textit{Specific adjusted}\\ \textit{emission factor}\end{matrix}\right)\left(\frac{1\ ton}{2{,}000\ lb}\right)$$

$$= (.17)\ (118 \times 10^6\ gal)\left(\frac{0.3\ lb\ VOC}{1{,}000\ gal}\right)\left(\frac{1\ ton}{2{,}000\ lb}\right)$$

$$= 3.0\ \textit{tons/yr VOC}$$

Total 1990 VOC Emissions from Stage I Tank Truck Unloading in ***County*** *A*

$$318.9 + 155.1 + 3.0 = 477.0\ \textit{tons/yr VOC}$$

Summer day VOC emissions were calculated using a seasonal adjustment factor of 1.0 and a 312day operation schedule. Ozone season daily VOC emissions in County A from Stage tank truck unloading were 1.53 tons/day.

5.4 EMISSIONS FROM DRY CLEANING OPERATIONS

Emissions of VOC from dry cleaning operations may be estimated on a per employee basis. The following example shows how this estimation procedure may be documented,

Procedure for Estimating VOC Emissions from Dry Cleaning Operations in County A

Total VOC emissions from dry cleaning operations in County A were determined on a per employee basis using the emission factor provided in the EPA Procedures document. Emissions were also calculated for a typical ozone season day.

According to County Business Patterns, 1,141 persons were employed in the dry cleaning industry in County A in 1988 (757 under SIC 7215 and 384 under SIC 7216). Using the EPA Procedures document emission factor, emissions for 1990 were calculated as follows:

Total VOC emitted by dry cleaning operations = (1,141 *employees) (2,210 lb VOC per employee/yr*)

= 2,521,610 *lb of VOC emitted/yr*

= 1,261 *tons of VOC emitted/yr*

Therefore, 1,261 tons/yr of VOC were emitted from dry cleaning operations in County A in 1990.

From the EPA Procedures document it was detetmined that there was uniform activity (1.0) for dry cleaning operations, and that most facilities operated 5 days per week. Seasonally adjusted emissions were calculated as follows:

$$\text{Daily VOC emissions during the ozone season} = \left(\frac{,261 \text{ tons of VOC}}{\text{yr}}\right)\left(\frac{1 \text{ yr}}{52 \text{ weeks}}\right)\left(\frac{1 \text{ week}}{5 \text{ days}}\right)$$

$$= 4.9 \text{ tons/day voc}$$

Two dry cleaning facilities in County A are reported as point sources in the 1990 State emission inventory report. Emissions from these two facilities totalled 1,151 .1 lb (0.58 tons) of VOC per day. This amount was subtracted from the area source estimate:

$$4.9 \text{ tom VOC} - 0.58 \text{ tons VOC} = 4.3 \text{ tons of VOC per day}$$

Therefore, 4.3 tons/day of VOC were emitted from dry cleaning operations in County A during the 1990 ozone season.

5.5 EMISSIONS FROM GRAPHIC ARTS FACILITIES

Emissions of VOC from graphic arts facilities are determined by using population data and emission factors from the EPA Procedures document (EPA-45014-91-016). Other sources of information used in the estimation procedure should be clearly referenced.

Graphic arts facilities with VOC emissions of greater than 10 but less than 100 tons per year are considered point sources and are subtracted from area source estimates. Facilities with emissions greater than 100 tons per year should not be subtracted because they have already been excluded from the emission factors.

The following example shows how the procedure for estimating emissions for a single county may be documented. Note that if county population data are given elsewhere in the inventory report and they are properly referenced, the information need not be repeated here. However, the appropriate table or page number where the information is located must be indicated.

Procedure for Estimating VOC Emissions from Graphic Arts Facilities in County A

Emissions of VOC from graphic arts facilities in County A were estimated using the recommended approach outlined in the EPA Procedures document based on population. According to U.S. Census data, the 1990 population of County A was 450,000. An emission factor of 1.3 pounds of VOC per person was applied, as indicated in the EPA Procedures document. From these data, VOC emissions were estimated as follows:

$$\text{Total VOC emissions in County A} = (450{,}000 \text{ persons})(1.3 \text{ lb VOC/person/yr})$$

$$= 585{,}000 \text{ lbs } (293 \text{ tons}) \text{ VOC/yr}$$

Four graphic arts facilities with emissions of less than 100 tons of VOC per year in 1990 are located in County A. According to the State point source inventory, these four facilities combined emitted a total of 160 tons of VOC in 1990. This amount was subtracted from the unadjusted County A total of 293 tons to obtain an adjusted total as follows:

$$\text{Adjusted Total VOCs emitted in County A in } 1990 = 293 - 160$$

$$= 133 \text{ tons VOC/yr}$$

Therefore, 1990 emissions of VOC in County A equaled 133 tons/yr.

A seasonal activity factor (ACF) was used to convert annual emissions to daily emissions (tons per day) during the ozone season. The ACF represents the number of days of emissions per week from graphics arts facilities (5 days per week) and any seasonaljluctuation in production (1.0 = uniform distribution). These factors were obtained from the EPA Procedures document.

$$ACF = (1.0)(5 \text{ days per week})(52 \text{ weeks per year})$$

$$= 260 \text{ days per year}$$

$$\textit{Ozone season day VOC emissions} = (133\ \textit{tons per year VOC})\left(\frac{1\ \textit{year}}{260\ \textit{days}}\right)$$

$$= 0.51\ \textit{tons of voc}$$

Therefore, VOC emitted from area graphic arts facilities in County A equaled 0.51 tons per ozone season day in 1990.

5.6 EMISSIONS FROM CUTBACK ASPHALT USE

Emissions of VOC from cutback asphalt use must be estimated for each nonattainment county. Because VOC emissions from cutback asphalt use are different for different types of asphalt, the weight of each asphalt type used must be determined. The quantity of each type of asphalt used must be provided on a per volume basis. The volume of each asphalt type must then be converted to weight by using the densities of the different asphalt types and their components. The sources of information for total asphalt use and use by type should be clearly referenced in the inventory report.

The following example shows how the information for obtaining VOC emissions from cutback asphalt use in one county can be presented. Total State VOC emissions were apportioned to the county level on a vehicle-mile-travelled (VMT) basis. However, other methods may be used. Example documentation is shown below.

Procedure for Estimating VOC Emissions from Cutback Asphalt Use in County A

Emissions of VOC from cutback asphalt use in County A were estimated by first determining total 1990 cutback asphalt usage. This information was obtained from the Asphalt Institute in Washington, D.C. According to the Institute, 3,871 tons of cutback asphalt were used in County A in 1990.

$$\text{Total State cutback asphalt use} = 3{,}871 \text{ tons} * \left(\frac{2{,}000 \text{ lb}}{\text{ton}}\right) * \left(\frac{0.45 \text{ kg}}{\text{lb}}\right)$$

$$= 3{,}483{,}900 \text{ kg/yr}$$

XYZ Company, a State highway construction contractor, was contacted for information on the amounts of different types of cutback asphalt used in the State. According to XYZ, 90 percent (by volume) of the asphalt used in the State in 1990 was rapid cure, and 10 percent (by volume) was medium cure. No slow cure was used in the State in 1990.

Each type of asphalt has a different diluent density. The densities for each asphalt type were obtained from AP-42. The EPA Procedures document notes that the average diluent content of cutback asphalt is 35 percent. This information was used to calculate the density of the combined cement and diluent and then the volume of each type of asphalt used. Once the volume and density of each asphalt type were known, tons used could be determined. Total use on a per volume basis was calculated as follows.

Densities from AP-42:

Cement density	= 1.1 kg/P
Rapid Cure diluent density	= 0.7 kg/ℓ
Medium Cure diluent density	= 0.8 kg/P

Rapid Cure Density (Diluent and Cement)

$$= \left(\frac{0.7 \text{ kg}}{\ell \text{ diluent}}\right)(0.35) + \left(\frac{1.1 \text{ kg}}{\ell \text{ cement}}\right)(0.65) = \frac{0.96 \text{ kg}}{\ell}$$

Medium Cure Density (Diluent and Cement)

$$= \left(\frac{0.8 \text{ kg}}{\ell \text{ diluent}}\right)(0.35) + \left(\frac{1.1 \text{ kg}}{\ell \text{ cement}}\right)(0.65) = \frac{0.995 \text{ kg}}{\ell}$$

The total weight of asphalt used was calculated using the following procedures.

$$\text{Total asphalt weight} = \left(\text{Volume of Rapid Cure}\right)\left(\text{Density of Rapid Cure}\right) + \left(\text{Volume of Medium Cure}\right)\left(\text{Density of Medium Cure}\right)$$

$$3{,}483{,}900\ kg = \left(\text{Volume of Rapid Cure}\right)\left(\frac{0.96\ kg}{\ell}\right) + \left(\text{Volume of Medium Cure}\right)\left(\frac{0.995\ kg}{\ell}\right)$$

$$3{,}483{,}900\ kg = 9\left(\text{Volume of Rapid Cure}\right)\left(\frac{0.96\ kg}{\ell}\right) + \left(\text{Volume of Medium Cure}\right)\left(\frac{0.995\ kg}{\ell}\right)$$

Therefore, 361,588 liters of medium cure asphalt were used in the State in 1990 and 3,254,292 liters of rapid cure asphalt were used in the State in 1990.

The diluent is the source of VOC emissions. The following procedure was used to determine the total weight of diluent for each type of cutback asphalt used.

In order to estimate the amount of VOC emitted from cutback asphalt use in 1990, the total weight of diluent used was determined. To determine the weight of each type of diluent used, the known volumes of each asphalt type used were multiplied by the density of each asphalt type and the diluent fraction.

Rapid Cure:

$$(3{,}254{,}292\ \ell) \cdot (0.35\ \text{diluent})\left(\frac{0.71\ kg}{\ell}\right) = 808{,}692\ \text{kg of diluent}$$

Therefore, total weight of rapid cure diluent used statewide = 808,692 kg/yr.

Medium Cure:

$$(361{,}588\ \ell) * (0.35\ \text{diluent})\left(\frac{0.8\ kg}{\ell}\right) = 101{,}245\ \text{kg of diluent}$$

Therefore, total weight of medium cure diluent used statewide = 101,245 kg/yr.

From AP-42, it was determined that 95 percent of rapid cure diluent and 70 percent of medium cure diluent evaporates as VOC. VOC emissions for each type of diluent were calculated using the following equations:

Rapid Cure:

$$808{,}692 \text{ kg diluent} * \left(\frac{.95 \text{ kg VOC}}{\text{kg diluent}}\right) = 768{,}257 \text{ kg VOC}$$

Medium Cure:

$$101{,}245 \text{ kg diluent} * \left(\frac{0.70 \text{ kg VOC}}{\text{kg diluent}}\right) = 70{,}872. \text{ kg VOC}$$

Total 1990 VOC emissions for the State were determined by adding the emissions from rapid cure and medium cure diluents and converting them to tons of VOC emitted as follows:

$$839{,}129 \text{ kg VOC} * \left(\frac{2.2 \text{ lbs}}{\text{kg}}\right) * \left(\frac{1 \text{ ton}}{2{,}000 \text{ lbs}}\right) = \underset{\text{statewide}}{923 \text{ tons/yr VOC}}$$

Therefore, total 1990 VOC emissions from cutback asphalt paving in the State equaled 923 *tons.*

Total State emissions were apportioned to County A according to the percentage of VMT in that county. According to the State Department of Transportation, total State VMT in 1990

were 35,000,000 and total County A VMT were 456,000. VOC emissions for County A were calculated as follows:

$$\text{Total State VMT} = 35{,}000{,}000 \text{ miles}$$

$$\text{County VMT} = 456{,}000 \text{ miles}$$

$$\text{County VOC emissions} = \left(\frac{\text{Total VOC emissions}}{\text{State VMT}}\right) * (\text{County VMT})$$

$$= \left(\frac{39 \text{ tons voc}}{35{,}000{,}000}\right) (456{,}000)$$

$$= 12.23 \text{ tons of VOC}$$

Therefore, total 1990 VOC emissions in County A from cutback asphalt use equaled 12.2 tons per year.

Cutback asphalt application is not prohibited in the summer in the State, so no seasonal adjustment factor was applied to total VOC emissions. No weekly activity factor is given in the EPA Procedures document, so a S-day-per-week activity factor was assumed. The amount of VOCs emitted on a typical ozone season day was estimated using the following equation:

$$\text{VOCs emitted per ozone season day} = \left(\frac{\text{emissions}}{\text{per year}}\right)\left(\frac{1 \text{ week}}{5 \text{ days}}\right)\left(\frac{1 \text{ year}}{52 \text{ weeks}}\right)$$

$$= \left(\frac{12.2 \text{ tons}}{yr}\right) (.0038)$$

$$= 0.047 \text{ tons per day}$$

Therefore, VOC emissions in County A from cutback asphalt use equaled 94 pounds/day for a typical ozone season day.

5.7 APPLICATION OF PESTICIDES

In this example, the sample procedures that could be used to estimate emissions of VOC from the application of pesticides to crops are documented. Emissions numbers were calculated for the use of one pesticide, Atrazine, on two different crops: corn and sorghum. This example is a simplified version of what is likely to be needed for areas with a large amount of agricultural activity where more than one pesticide is likely to be used. Generally, data on pesticide use are hard to obtain, so the preferred emissions estimate approach becomes one that is linked to the amount of crops grown in the county. County Extension Agents or State university agriculture departments can be contacted to identify the types of pesticides used on a given crop and their application rates.

Procedure for Estimating VOC Emissions from Application of Atrazine in County A

In order to determine emissions from Atrazine use, the primary crops treated with this pesticide were first identified. Corn and sorghum crops used the largest amount of Atrazine according to the County Agricultural Extension Service. The methodology used to estimate emissions involved determining the number of acres in corn and sorghum in County A, the amount of Atrazine applied to the crops, and the reactive fractions of both the active and inactive components of the pesticide.

The acreage devoted to corn and sorghum crops for the County in 1990 was determined from data from the State Department of Agriculture (State Crop Statistics, 1990). In 1990, 150 acres were devoted to sorghum production and 500 acres were devoted to corn production. It was estimated that Atrazine was used on 56percent of the corn crops and on 73 percent of the sorghum crops. The average usage rate of Atrazine was 3.8 pounds per acre on corn crops and 4 pounds per acre on sorghum crops.

$$\text{Total corn acreage using Atrazine} = (0.56)\ (500\ \text{Acres})$$

$$= 280\ \text{acres of corn treated with Atrazine}$$

$$\text{Total sorghum acreage using Atrazine} = (0\ 73)\ (150\ Acres)$$

$$= 109.5\ acres\ of\ sorghum\ treated\ with\ Atrazine$$

$$\text{Total Atrazine used on corn} = (280\ Acres)\left(\frac{3.8\ lbs}{acre}\right)$$

$$= 1{,}064\ lbs\ of\ Atrazine\ used\ in\ 1990$$

$$\text{Total Atrazine used on sorghum} = (109.5\ acres)\left(\frac{4\ lbs}{acre}\right)$$

$$= 438\ lbs\ of\ Atrazine\ used\ in\ 1990$$

Total amount of Atrazine used on all crops = 1,502 lbs

Emission factors were determined by computing a weighted sum of the proportions of active and inert ingredients; the reactive fractions served as weights. The State Agricultural Extension Agent at State University provided the following information:

Percent active ingedients for Atrazine = 47%

Reactive fraction of active ingredients = 90%.

Percent inactive ingedients for Atrazine = 53%

Reaction fraction of inactive ingredients = 60%.

$$\text{Emissions from Atrazine} = \text{Total amount of Atrazine used}\ (0\ 47)\ (0\ 90) + \text{Total amount of Atrazine used}\ (0.53)\ (0.60)$$

$$= 635 + 478$$

$$= 1{,}113\ lbs\ VOC$$

Therefore, total 1990 emissions from the use of Atrazine in the County were 1,113 lbs VOC/yr.

From the EPA Procedures document, the seasonal adjustment factor for pesticide use is 1.3 and the number of activity days per week is six.

$$\begin{pmatrix}\text{Ozone season}\\ \text{daily VOC emissions}\\ \text{from Atrazine use}\end{pmatrix} = \begin{pmatrix}\text{Total Atrazine}\\ \text{VOC emissions}\\ \text{per year}\end{pmatrix} (1.3) \left(\frac{1 \text{ year}}{52 \text{ weeks}}\right) \left(\frac{1 \text{ week}}{6 \text{ days}}\right)$$

$$= (1{,}113 \text{ lbs VOC}) (1.3) (0.0032)$$

$$= 4.6 \text{ lbs of VOC emitted}$$

Therefore, the total daily VOC emissions form Atrazine use in County A per ozone season day is 4.6 lbs or 0.0023 tons/day.

5.8 EMISSIONS FROM COMMERCIAL/CONSUMER SOLVENT USE

The example in this section shows how to document the procedure for estimating VOC emissions from commercial/consumer solvent use by using a per capita emission factor.

Procedure for Estimating VOC Emissions from Commercial/Consumer Solvent Use in County A

Emissions from commercial/consumer solvent use were determined using the emissions-per-capita method described in Section 4.3.8 of the EPA Procedures document. Emissions were calculated for a typical ozone season day.

County population statistics were obtained from the Ozoneville Department of Human Statistics publication Ozoneville Population Growth Rates and Projections - County level Analysis. This publication estimated 1990 population in County A to be 450,000 people. A yearly emission factor of 6.3 lbs of VOC emitted per person from commercial/consumer solvent use was obtained from the EPA Procedures document. This emission factor was used with the total population to determine yearly VOC emissions as follows:

$$\text{Yearly VOC emitted from Commercial/Consumer solvent use in the county} = \left(\text{County population}\right)\left(\frac{6.3\ lb\ VOC}{person}\right)$$

$$= (450{,}000\ persons)\ (6.3\ lb\ VOC/person/yr)$$

$$= 2{,}835{,}000\ lbs\ VOC\ emitted/yr$$

$$= 1{,}418\ tons\ VOC\ emitted/yr$$

Therefore, 1,418 tons/yr of VOC from commercial/consumer solvent use were emitted in County A in 1990.

According to the EPA Procedures document, VOC are emitted from solvent use in a uniform manner for the whole year. Emissions for a typical ozone season day were calculated as follows:

$$\text{VOC emissions per ozone season day} = (1{,}418\ tons\ VOC\ per\ year)\left(\frac{1\ year}{365\ days}\right)$$

$$= 0.37\ tons\ VOC\ emitted/day$$

Therefore, 0.37 tons VOC/day were emitted in County A from commercial/consumer solvent use for a typical ozone season day in 1990.

5.9 ORCHARD HEATERS

Some area source categories may be applicable to a given nonattainment area, but are either not present in large enough quantities to produce significant emissions, or may not have been used in 1990. These facts should be noted in the inventory report. The following example shows how to document a category that is believed to be negligible or nonexistent.

According to the State Department of Agriculture, orchard heaters were not used in the inventory counties during 1990. This fact was confirmed through telephone calls to the County A Agricultural Extension Agent. The Extension Agent indicated that orchard heaters are not used in the County because hard freezing, not just borderline freezing, weather can occur. Under these conditions, orchard heaters fail to warm a sufficient volume of air to save a cold-sensitive crop. Therefore, emissions from orchard heaters were estimated as zero.

5.10 WOODSTOVES AND FIREPLACES

This example illustrates documentation for a CO emission category. In the following example, County A has had a regulation banning uncertified stoves since **1988.** Because **CO** emissions depend on stove type, the State used a survey to estimate both the number of woodstoves and fireplaces in County A as well as stove type. This example is for an inventory in a County that is nonattainment for CO. For an ozone inventory, woodstove and fireplace emissions may be negligible because the ozone season is usually in the summer.

A mail survey was developed for estimating CO emissions from woodstoves and fireplaces using methods suggested in the Guidance Document for Residential Wood Combustion Emission Control Measures (EPA-450/2-89-015). Survey data were used to estimate the percentage of homes in County A burning wood and the average amount of wood burned in a season. It was assumed that the survey results were representative of County A as a whole, and thus were applied to the entire County.

The CO emission factors for fireplace and woodstove use were given for tons of wood burned, requiring that the survey data, in cords, be converted to tons of wood using a fonnula from the EPA wood combustion guidance document. Once the total amount of wood burned was determined, the amount of wood burned in fireplaces and woodstoves was calculated. When the amount of wood burned in woodstoves in County A was known, the average wood use per stove type was calculated. Total CO emissions were then determined for each woodstove type and fireplaces for the 19894990 heating season. Rule effectiveness was applied

to certified woodstove emissions. A seasonal adjustment was used to calculate CO emissions for a typical CO season day.

The following survey results were assumed to be representative of County A wood use:

- 14% of the respondents bum wood;
- The average amount of wood burned was .25 cords per household;
- 60% of the wood burned was used in fireplaces;
- 40% of the wood burned was used in woodstoves;
- 20% of woodstoves are non-certified; and
- [illegible] of woodstoves are certified, and of these:
  - 65% are non-catalytic woodstoves
  - 35% are catalytic woodstoves.

According to County A tax records, there are approximately 28,600 single-family homes in the County. Fourteen percent (4,004) of County A's homes are assumed to have burned wood in 1989-1990. If 0.25 cord of wood were burned per home, then approximately 1,000 cords of wood were burned in the 1989-1990 heating season.

The density of the wood burned was needed to convert cords of wood to tons of wood. Wood density differs with wood type. The survey found that about 50 percent of the wood burned was white oak, 40 percent hickory, and 10 percent southern pine. A composite density was determined for the wood burned in County A. Wood density information was obtained from Appendix A of AP-42. A conversion factor, (the volume of a cord of solid wood = 80 ft^3/cord), from the EPA wood combustion guidance document, was used with wood densities to convert cords to tons.

$$\textit{Density of wood burned} = \textit{50\% (white oak)} + \textit{40\% (hickory)} + 10\% \text{ (southern pine)}$$

$$= 0.50\left(\frac{48\ lb}{ft^3}\right) + 0.40\left(\frac{48\ lb}{ft^3}\right) + 0.10\left(\frac{40\ lb}{ft^3}\right)$$

$$= \frac{47.2\ lbs}{ft^3}$$

Conversion Equation Examples:

$$\textit{Fireplace average yearly wood use} = \begin{pmatrix}\textit{Total number of cords burned per year}\end{pmatrix} * \begin{pmatrix}\textit{Percent of wood burned in fireplaces}\end{pmatrix} * \begin{pmatrix}\textit{Volume of a cord of solid wood}\end{pmatrix} * \begin{pmatrix}\textit{Density of the types of wood burned}\end{pmatrix}$$

$$= (1000 \text{ Cords}) * (0.60) * \left(\frac{80\ ft^3}{cord}\right) * \left(\frac{47.2\ lb}{ft^3}\right)$$

$$= \textit{2,265,600 lbs wood used in fireplaces} * \left(\frac{1\ ton}{2000\ lbs}\right)$$

= *1,133 tons wood/yr used in fireplaces*

$$\textit{Woodstove average yearly wood use} = \begin{pmatrix}\textit{Total number of cords burned per year in woodstoves}\end{pmatrix} * \begin{pmatrix}\textit{Volume of a cord of solid wood}\end{pmatrix} * \begin{pmatrix}\textit{Density of the types of wood burned}\end{pmatrix}$$

$$= (400\ cords) * \left(\frac{80\ ft^3}{cord}\right) * \left(\frac{47.2\ lbs}{ft^3}\right)$$

= 1,510,400 *lbs of wood burned*

= 755 *tons of wood/yr used in woodstoves*

Emission Calculations:

$$\text{Total emissions from fireplaces} = \left(\begin{matrix}\text{Total amount}\\ \text{of wood burned}\\ \text{in fireplaces}\end{matrix}\right)\left(\begin{matrix}\text{Emission}\\ \text{factor for}\\ \text{fireplaces}\end{matrix}\right)\left(\frac{\text{Conversion factor 1 ton}}{2000\ \text{lbs}}\right)$$

$$= (1133\ \text{tons}) \cdot \left(\frac{170\ \text{lbs CO}}{\text{ton wood}}\right) * \left(\frac{1\ \text{ton}}{2000\ \text{lbs}}\right)$$

$$= \begin{matrix}96\ \text{tom CO/yr}\\ \text{emitted by fireplaces}\\ \text{in County A for the}\\ \text{1989 -90 season}\end{matrix}$$

The emission factor forjireplaces, 170 lb CO/ton of wood, was obtained from AP-42, Section 1.9. There are no regulations affecting fireplace burning in County A, so rule penetration and rule effectiveness were not applied to the fireplace emission calculations.

In order to calculate emissions from woodstoves, activity levels were calculated for each stove type. Survey results and regional sales data were used to determine the number of different types of certified stoves sold since the 1988 regulation banning the sale of uncertified stoves. Specific emission factors for each stove type came from AP-42 and are shown below.

755 tons of wood were burned per year by woodstoves in County A.

Amount of wood burned by non-certified stoves:

$$= \left(\begin{matrix}\text{\% of}\\ \text{non-certified}\\ \text{woodstoves}\end{matrix}\right) * \left(\begin{matrix}\text{tons of wood}\\ \text{burned in}\\ \text{woodstoves}\end{matrix}\right)$$

$$= (0.20) * 755$$

$$= 151\ \text{tons of wood}$$

Amount of wood burned by certified stoves:

$$= \begin{pmatrix} \% \text{ of stoves} \\ \text{that are certified} \end{pmatrix} * \begin{pmatrix} \% \text{ use of} \\ \text{specific certified} \\ \text{stove type} \end{pmatrix} * \begin{pmatrix} \text{Total amount} \\ \text{of wood used} \\ \text{in woodstoves} \end{pmatrix}$$

Non -catalytic = (0.80) (0.65) * 755 = 393 *tons of wood bunted*

Catalytic = *(0.80) (0.35) * 755* = 211 *tons of wood burned*

Control efficiencies for each stove type were obtained by calculating the ratio of the control emission factor to the non-control emission factor.

$$\left[1 - \left(\frac{260}{270}\right)\right] x\ 100 = \begin{matrix} 3.7\% \\ \text{reduction} \end{matrix} \quad \& \quad \frac{78}{270} = \begin{matrix} 71\%' \\ \text{reduction} \end{matrix}$$

The CO emission factors, by stove type, are summarized below:

Stove Type	Emission Factor	Control Efficiency (%)
Fireplace	170 lb CO/ton wood	0
Non-certified stoves:		
Conventional non-catalytic	270 lb CO/ton wood	0
Certified stoves:		
Non-catalytic	260 lb CO/ton wood	3.7
Catalytic	78 lb CO/ton wood	71

Emission calculation for conventional non-certified woodstoves:

$$= \begin{pmatrix} \text{tons of wood burned} \\ \text{by non-certified stove} \end{pmatrix} (\text{CO emission factor})$$

$$= (151 \text{ tons wood}) \left(\frac{270 \text{ lb CO}}{\text{ton wood}}\right) \left(\frac{1 \text{ ton}}{2000 \text{ lb}}\right)$$

= 20.4 *tons CO/yr*

*Rule **effectiveness** was factored into the emission estimate as follows:*

Certified non-catalytic stove emissions:

$$= \left(\begin{matrix}\textit{Wood}\\ \textit{burned}\end{matrix}\right) * \left(\begin{matrix}\textit{Uncontrolled}\\ \textit{emission}\\ \textit{factor}\end{matrix}\right) \cdot [1\text{-(Control } \textit{Efficiency)}\ (0.80\ \textit{Rule Effectiveness})]$$

$$= (393\ \textit{tons of wood}) \left(\frac{270\ \textit{lb CO}}{\textit{ton wood}}\right) \cdot [1-(.037)\ (0.80)]$$

$$= 102{,}969\ \textit{lbs of CO} \left(\frac{1\ \textit{ton}}{2{,}000\ \textit{lbs}}\right)$$

$$= 51.5\ \textit{tons of CO/yr}$$

Catalytic stove emissions:

$$= \left(\begin{matrix}\textit{Wood}\\ \textit{burned}\end{matrix}\right) * \left(\begin{matrix}\textit{Uncontrolled}\\ \textit{emission}\\ \textit{factor}\end{matrix}\right) \cdot [1\text{-(Control } \textit{Efficiency)}]\ (0.80\ \textit{Rule Effectiveness})$$

$$= (211\ \textit{tons of wood}) \left(\frac{270\ \textit{lb CO}}{\textit{ton wood}}\right) \cdot [1-(.71)\ (.80)]$$

$$= 24{,}611\ \textit{lbs of CO} \left(\frac{1\ \textit{ton}}{2{,}000\ \textit{lbs}}\right)$$

$$= 12.3\ \textit{tons of CO/yr}$$

Total emissions were calcuhted by adding. together the emissions from each stave type and fireplace emissions:

$$\begin{matrix}\textit{Total}\\ \textit{emissions from}\\ \textit{County A}\end{matrix} = \begin{matrix}\textit{Fireplace}\\ \textit{emissions}\end{matrix} + \begin{matrix}\textit{Emissions from}\\ \textit{non-certified}\\ \textit{woodstoves}\end{matrix} + \begin{matrix}\textit{Emissions from}\\ \textit{non-catalytic}\\ \textit{certified stoves}\end{matrix} + \begin{matrix}\textit{Emissions from}\\ \textit{catalytic}\\ \textit{woodstoves}\end{matrix}$$

$$\text{Total emissions} = (96 \text{ tons CO}) + (20.4 \text{ tons CO}) + (51.5 \text{ tons CO}) + (12.3 \text{ tons CO})$$

$$= 180 \text{ tons CO per year}$$

The total yearly CO emissions were adjusted to represent typical daily emissions during the CO season. The State assumed that 70percent of the yearly wood combustion occurred between November and February (120 days). The Seasonal Adjustment Factor (SAF) was calculated according to Section 58.4 of the Procedures document.

$$SAF = \left(\frac{\text{\% of wood burned in season}}{\text{season length}}\right)(12\text{-month period})$$

$$= \left[\frac{(.70)}{4 \text{ months}}\right] * (12 \text{ months})$$

$$= 2.1$$

CO Emissions for a Typical CO Season Day

$$= \text{Yearly emissions} * \frac{(SAF)}{\left(\frac{\text{Number of activity days}}{\text{week}}\right)(52 \text{ weeks})}$$

$$= \frac{180 \text{ tons CO}}{yr} * \frac{(2.1)}{\left(\frac{7 \text{ days}}{\text{week}}\right)(52 \text{weeks})}$$

$$= \frac{1.04 \text{ tons CO}}{day}$$

SECTION 6

NON-ROAD MOBILE SOURCES

This section of the guidance document provides instructions and examples for documenting VOC, NO_x, and CO emission from non-road mobile sources. The categories that are specified for inclusion in an emission inventory report, as given in the EPA guidance document Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources (EPA-450/4-81-026d), are:

- Aircraft;
- Locomotives;
- Agricultural equipment;
- Industrial equipment;
- Construction equipment;
- Lawn and garden equipment;
- Marine vessels (commercial and recreational);
- Non-road motorcycles; and
- Snowmobiles.

In February 1992, EPA's Office of Mobile Sources (OMS) announced that it would prepare 1990 base year emission estimates for selected non-road categories for extreme, serious, severe, and moderate nonattainment areas. The categories to be addressed included all of the primary non-road source types except aircraft, locomotives, and commercial vessels.

Example documentation is given below for the agricultural equipment (Section 6.2) and locomotive (Section 6.3) non-road categories. The examples indicate the minimum level of documentation that should be provided to support non-road emission estimates,

6.1 INTRODUCTION

The introduction to the non-road mobile sources section should identify which source categories are addressed in the inventory. If a source category from the EPA's list of categories was not included in the inventory, this needs to be specified and a reason given for the omission.

The introduction should specify whether any OMS estimates were used in the inventory report or whether the State determined any or all of its own emission estimates. If OMS estimates were used and documentation for the OMS values is available, the documentation should also be included.

6.2 AGRICULTURAL EQUIPMENT EMISSIONS

Emissions from agricultural equipment result from fuel combustion; therefore, county-specific information on fuel use for this type of equipment is needed in order to use AP-42 emission factors to estimate emissions. The documentation should include fuel use data and identify the source of the data.

Typically, fuel use data are derived. The derivation procedure and associated references must be clearly documented. Such documentation should begin by describing the approach used to estimate emissions and by presenting the county-specific data with references. If the approach outlined in the EPA mobile sources document (EPA-450/4-81-026d) is used, the county-specific information should include:

- Equipment counts;
- Cultivated acres; and
- The ratio of gasoline use to diesel use for 1990, if different from the year in which the equipment counts were made.

An example of how this information can be presented is given below.

To determine whether fuel use data for agricultural equipment were available, the State FGH Department of Commerce was contacted. The Department representative indicated that data specific to agricultural use are not collected (Ref. 1). Therefore, emissions were estimated using guidance provided in the EPA Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (EPA-450/4-51-026d).

The 1987 Census of Agriculture was used for equipment counts (Ref. 2). These data are summarized by county in Table 6-l. Inform&on on the percent of equipment that is gasoline-powered and the percent that is diesel-powered was determined from figures provided in AP-42. AP-42 does not differentiate between the different types of general purpose equipment, or between the two sizes of tractors that the Census of Agriculture tracks; therefore, the percentages for the category were applied.

Both county agricultural extension services in the nonattainment area were contacted to determine the number of cultivated acres so that equipment counts could be extrapolated from 1987 to 1990 (Refs. 3, 4). Data on cultivated acres in State FGH are summarized in Table 6-2.

References:

1. Telecon. A. Smith, State FGH Air Quality Division, with B. Jones, State FGH Department of Commerce. November 10, 1991.

2. U. S. Department of Commerce, Bureau of the Census. 1987 Census of Agriculture. Volume 1 Geographic Area series Part 33 State Y State and County Data. Issued July 1989. pp. xx.

3. Telecon. A. Smith, A, State FGH Air Quality Division, with T. Brown, Reporting Company. November 10, 1991.

4. Telecon. A. Smith, State FGH Air Quality Division, with T. Brown, Reporting Company. November 10, 1991.

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TABLE 6-1. AGRICULTURAL EQUIPMENT COUNTS FUR STATE FGH IN 1987

Equipment Type	Fuel Type		County A		Total for County A	Number of Gasoline-powered in County A	Number of Diesel-powered in County A	County B		Total for County B	Number of Gasoline-powered in County B	Number of Diesel-powered in County B	Total Gasoline-Powered	Total Diesel-powered
			Purchased					Purchased						
	% Gas	% Diesel	1983-87	Before 83				1983-87	Before 83					
Combines	50	50	13	87	100	50	50	19	39	58	29	29	79	79
Balers	100	0	22	24%	270	270	0	46	237	283	283	0	553	0
Harvesters	0	100	0	0	0	0	0	0	0	0	0	0	0	0
GENERAL PURPOSE:														
Cotton pickers	50	50	27	0	27	14	14	48	0	48	24	24	38	38
Mower conditioners	50	50	28	171	199	loo	100	48	138	186	93	93	193	193
Motortrucks	50	50	136	965	1,101	551	551	238	591	829	415	415	965	965
TRACTORS:														
Less than 40HP	70	30	25	596	621	435	186	33	259	292	204	88	639	274
40HP or more	70	30	66	631	697	488	209	85	406	491	344	147	832	356
												Nontractor Equipment	1,827	1,274
												Tractor	1,471	630
												Total Equipment	3,298	1,904

NOTES:

1987 Census of Agriculture does not list harvesters.

AP-42 does not differentiate between the general purpose equipment types; therefore, the percents for gasoline and diesel use were applied to all types.

AP-42 does not indicate the percent of tractors that are gasoline vs. diesel by horsepower.

TABLE 6-2. CULTIVATED ACRES IN STATE FGH

County	Cultivated Acres	
	1987[2]	1990[3,4]
A	44,138	39,340
B	37,803	36,103
TOTAL	81,941	75,443

The 1990 fuel use per acre cultivated is derived from the equipment counts, annual fuel use data, average annual fuel throughput for agricultural equipment [Table 3-2 of the EPA mobile sources document (EPA-450/4-81-026d], and the number of cultivated acres. Each step in the calculation and the appropriate references should be included in the emission inventory report. An example of how to present fuel use is shown in Table 6-3 and in the following paragraphs.

The 1987 fuel use by agricultural equipment was estimated using the 1987 equipment shown in Table 6-l and the average annual fuel use dam provided in the EPA mobile sources document (EPA-450/4-81-026d) (see Table 6-3). Diesel use was adjusted by a factor of 1.4 to normalize the diesel and gasoline uses on an equivalent energy basis, according to the instructions in the mobile sources document.

Because of the similarity in the number of acres fanned in 1987 and in 1990 and the expense of new equipment, it is unlikely that the ratio of gasoline-to-diesel use would have changed during that time. It was therefore assumed that the mtio in 1990 remained the same as in 1987. Total 1990 fuel use was estimated by calculating the 1987 fuel use per acre and multiplying this value by the number of acres cultivated in 1990, as shown below:

TABLE 6-3. STATE FGH FUEL USE IN 1987

Equipment Type	Average Annual Gasoline (gals)	Fuel Use Diesel (gals)	Total Gasoline-powered Equipment	Total Diesel-powered Equipment	Total Gasoline Use (gals)	Total Diesel Use (gals)	Normalized Diesel Use (gals)
Combines	166	107	79	79	13,114	8,453	11,834
Bailers	56	36	553	0	30,968	0	0
Harvesters	281	180	0	0	0	0	0
GENERAL PURPOSE:							
Cotton Pickers	176	97	38	38	6,600	3,638	5,093
Mower Conditioners	176	97	193	193	33,880	18,673	26,142
Motor-trucks	176	97	965	965	169,840	93,605	131,047
TRACTORS:							
Less than 40HP	663	1,460	639	274	423,723	399,894	559,852
40HP or more	663	1,460	832	356	551,351	520,344	728,482
				1987 Tractor Fuel Use	975,074	920,238	**1,288,333**
				1987 Fuel Use by Other Equipment	254,402	124,368	174,115
				Total 1987 Fuel Use	**1,229,476**	**1,044,606**	**1,462,448**

NOTES:

1987 Census of Agriculture does not list harvesters.

The Procedures document does not provide fuel use for each type of general purpose equipment or for the different tractor sizes.

$$\textit{Total 1987 fuel use per acre} = \frac{\textit{(total 1987 fuel use)}}{\textit{(1987 cultivated acres)}}$$

$$= \frac{\textit{(total 1987 gasoline use + 1987 diesel use)}}{\textit{(8 1,941 acres)}}$$

$$= \frac{\textit{(1,229,476 + 1,462,448 gals)}}{\textit{81,941 acres}}$$

$$= \frac{\textit{(2,691,924 gals)}}{\textit{81,941 acres}}$$

$$= \textit{32.9 gals per acre}$$

$$\textit{Total 1990 fuel use} = \textit{(total 1987 fuel use per acre) (1990 cultivated acres)}$$

$$= \textit{32.9 gals per acre x 75,443 acres}$$

$$= \textit{2,482,075 gals}$$

Once the 1990 fuel use has been estimated, it must be allocated into four uses: (1) gasoline-powered tractors, (2) diesel-powered tractors, (3) gasoline-powered "nontractors" (Le., other agricultural equipment), and (4) diesel-powered "nontractors. " If data are unavailable for the inventory year, the assumptions made in using data from other years must be clearly stated. Each step in the allocation procedure should be shown. An example of how the documentation may be provided is given below.

The amount of fuel used by tractors compared to other agricultural equipment was also derived assuming the ratio of fuel use by the two categories of equipment for both fuel types remained the same in 1990 as it was in 1987. Using the data from Table 6-3, fuel use by type was calculated as follows:

$$1990 \text{ gasoline use} = (1990 \text{ fuel we}) \left(\frac{1987 \text{ gasoline use}}{1981 \text{ fuel we}} \right)$$

$$= (2{,}482{,}075 \text{ gals}) \left(\frac{1{,}229{,}476 \text{ gals}}{2{,}691{,}924 \text{ gals}} \right)$$

$$= 2{,}482{,}075 \text{ gals} \times 0.46$$

$$= 1{,}141{,}755 \text{ gals}$$

$$1990 \text{ diesel use} = 1990 \text{ fuel use} - 1990 \text{ gasoline use}$$

$$= 2{,}482{,}075 \text{ gals} - 1{,}141{,}755 \text{ gals}$$

$$= 1{,}340{,}320 \text{ gals}$$

$$1990 \text{ gasoline use by tractors} = (1990 \text{ total gasoline use}) \times \left(\frac{1987 \text{ gasoline use by tractors}}{\text{total 1987 gasoline use}} \right)$$

$$= 1{,}340{,}320 \text{ gals} \times \left(\frac{975{,}074 \text{ gals}}{1{,}229{,}476 \text{ gals}} \right)$$

$$= 1{,}340{,}320 \text{ gals} \times 0.79$$

$$= 1{,}058{,}853 \text{ gals}$$

$$1990 \text{ gasoline use by other equipment} = \text{total 1990 gasoline use} - \text{1990 tractor use of gasoline}$$

$$= 1{,}340{,}320 \text{ gals} - 1{,}058{,}853 \text{ gals}$$

$$= 281{,}467 \text{ gals}$$

$$\text{1990 diesel use by tractors} = (\text{1990 total diesel use}) \times \left(\frac{\text{1987 diesel use by tractors}}{\text{total 1987 diesel use}} \right)$$

$$= 1{,}340{,}320 \text{ gals} \times \left(\frac{1{,}288{,}333 \text{ gals}}{1462{,}448 \text{ gals}} \right)$$

$$= 1{,}340{,}320 \text{ gals} \times 0.88$$

$$= 1{,}179{,}482 \text{ gals}$$

$$\text{1990 diesel use by other equipment} = \text{total 1990 diesel use} - \text{1990 diesel use by other equipment}$$

$$= 1{,}340{,}320 \text{ gals} - 1{,}179{,}482 \text{ gals}$$

$$= 160{,}838 \text{ gals}$$

The emission estimation procedure should show the fuel use by tractors and other agricultural equipment separately and the emission factors that were applied. The AP-42 emission factors are available for hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides (NO_x); therefore, speciation information is needed to determine VOC emissions. From EPA documents on VOC speciation, the fraction of the total HC emissions that are reactive VOC is 0.95 for diesel-powered equipment and 0.97 for gasoline-powered equipment.

Once the annual emissions have been estimated, they must be temporarily allocated to establish emissions on typical ozone season and CO season days. The data on farming activity used to drive these daily emissions should be clearly documented and referenced as shown below.

Agricultural activity in State FGH begins in early April and continues through October, a total of seven months. Although equipment use may occur only during certain portions of this time provide, the county agricultural extension services could not provide more specific

information on use because different crops are put in at different times. Therefore, equipment use was considered to be continuous throughout this period.

The seasonal adjustment factor for the ozone season (June, July, and August) was based on constant operation of equipment during the seven-month agricultural activity period. Thus, the seasonal adjustment factor is:

$$\frac{1.0}{7} \times 12 = 1.7$$

The seasonal adjustment factor for the CO season (December, January, and February) is zero because no agricultural equipment is used during these months.

To approximate daily emissions, the work week was assumed to be six days. Emissions for a typical ozone season day were calculated as follows:

$$VOC\ emissions = \frac{(316{,}796\ lbs/yr) \times 1.7}{(6\ days/wk \times 52\ wks/yr)} = 1{,}726\ lbs/day$$

$$CO\ emissions = \frac{(4{,}399{,}303\ lbs/yr) \times 1.7}{(6\ days/wk \times 52\ wks/yr)} = 23{,}971\ lbs/day$$

$$NO_x\ emissions = \frac{(642{,}104\ lbs/yr) \times 1.7}{(6\ days/wk \times 52\ wks/yr)} = 3{,}499\ lbs/day$$

The HC evaporative loss emission factor requires that the equipment counts rather than the fuel use be known, The information used to derive base year equipment counts should be clearly shown. The resulting tractor emissions and emissions from other agricultural equipment should then be summed to determine annual pollutant-specific emissions from this source

category. Table 6-4 provides one way in which the emission estimation procedure can be presented.

6.3 LOCOMOTIVE EMISSIONS

Original guidance for estimating emissions from locomotives was contained in Chapter 6 of the EPA mobile sources document (EPA-450/4-81-026d). This chapter has been significantly revised and the Final Draft version has been available since the end of 1991. The revisions are incorporated into an updated Volume IV mobile sources document, which should be distributed to the EPA Regional Offices in March of 1992. The emission inventory documentation should state whether the revised estimation procedures were used. If not, the alternative source of information should be provided, along with a justification for its use.

If the revised estimation procedures were used, they should be discussed and any deviations noted and justified. For instance, the estimation procedures provide a recommended method for estimating emissions, as well as an alternative method and specific tailoring options. The inventory documentation should discuss any alternative method or specific tailoring options used.

The EPA mobile sources document classifies railroads into three categories according to size (based on revenues): Class I, Class II, and Class III. Locomotives within each railroad class are further divided into two categories: line haul locomotives, which perform line haul operations, generally traveling between distant locations; and yard (or switch) locomotives, which perform yard operations, primarily moving railcars within a particular railway yard.

For the purpose of estimating emissions, railroads are separated into three categories: (1) Class I Line Haul Locomotives, (2) Class II and Class III Line Haul Locomotives, and (3) Yard Operations. Different methods are used to estimate emissions from each category; therefore, each category should be discussed separately.

TABLE 6-4. EMISSIONS FROM AGRICULTURAL EQUIPMENT

Equipment Type	Type of Fuel Used	Amount of Fuel Used (gals)	1987 Equipment Counts	1990 Equipment Counts	Exhaust HC Emission Factor (lbs/10^3 gals)	Crankcase HC Emission Factor (lbs/10^3 gals)	Evaporative HC Emission Factor (lbs/unit)	CO Emission Factor (lbs/10^3 gals)	NO_x Emission Factor (lbs/10^3 gals)	Total HC Emissions (lbs)	Weight Fraction of Total HC that is VOC	Total VOC Emissions (lbs)	CO Emissions (lbs)	NO_x Emissions (lbs)
Tractors	Gasoline	975,074	1,471	1,353	125	25.1	34.4	3,260	151	192,913	0.97	187,126	3,178,741	147,236
	Diesel	1,288,333	630	580	60.7	0	0	119	335	78,202	0.952	74,448	153,312	431,592
Nontractor	Gasoline	254,402	1,827	1,681	135	27.1	3.5	4,100	105	47,172	0.97	45,757	1,043,048	26,712
	Diesel	174,115	1,274	1,172	57.1	0	0.0	139	210	9,942	0.952	9,465	24,202	36,564
									Total	328,229		316,776	4,399,303	642,104

NOTES:

Emission factors are taken from AP-42.

Data on reactive VOC fraction of total HC emissions were taken from EPA documents: Volatile Organic Compound (VOC) Species Data Manual (EPA-450/7-80-015) and Air Emissions Species Manual Volume I. Volatile Organic Species Profiles (EPA-450/2-88-003a).

$$\text{1990 equipment counts} = \left\{\begin{matrix}\text{1987 equipment} \\ \text{counts}\end{matrix}\right\} \times \left\{\frac{\text{1990 cultivated acres}}{\text{1987 cultivated acres}}\right\}$$

$$= (\text{1987 equipment counts}) \times \left\{\frac{75,443}{81,941}\right\}$$

$$= (1987 \text{ equipment counts}) \times 0.92$$

For Class I locomotives, traffic density and a fuel consumption index must be determined. A description of how these were determined and the sources of data should be provided, along with a list of the emission factors used and an example calculation. For Class II and Class III locomotives, a description of how fuel consumption was determined and an example emission estimation calculation should be provided.

The yard operations discussion should include a list of the railway yards contacted and the number of yard locomotives at each yard. Again, the emission factors used should be listed and an example calculation shown.

Emissions from all three categories should be converted from annual to daily emissions. Because railroad activity is generally constant throughout the year, annual emissions can be divided by 365 days to obtain daily emissions.

An example of how the locomotive emissions documentation might be presented is shown below. The example is for one county and one pollutant (CO). Emissions for other counties and pollutants would be done the same way. Total annual emissions are converted to daily emissions at the end of the example below.

Locomotive Emissions

For estimating locomotive emissions in Train County, EPA's **Final** ***Draft*** **version** *of Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources, issued to the EPA Regional Offices in March of 1992,* ***was*** *used.*

Class I Line Haul Locomotives--Class I emissions were calculated by multiplying fuel consumption by an appropriate emission factor. The determination of Class I fuel consumption and the source of the appropriate emission factor are discussed below. Fuel consumption was

obtained by dividing the traffic density in gross ton miles (GTM) by the fuel consumption index in GTM per gallon (GTM/gal), as shown below:.

$$\textit{Fuel consumption} = \textit{Traffic density/fuel consumption index}$$

Only one Class I railroad system operates in the inventory area. This system is owned and operated by Company A. Traffic dens@ for the entire state was obtained directly from the Association of American Railroads in Washington, D.C. Because the traffic density obtained was for the entire state, Company A was contacted to determine where Tmin County boundaries intersected the track segments. The Class I Train County traffic density, excluding locomotive weight, was 1,117,047,000 GTM.

The Interstate Commerce Commission's (ICC) annual "R-1 " report was obtained for Company A data. Copies of Schedules 750 and 755 are shown in Table 6-5. Annual fuel consumption from line 1 of Schedule 750 is 48,007,195 gal. Because traffic density excluded locomotive weight, total gross ton miles were obtained by subtracting line 98 from line 104 of Schedule 755: 24,703,611,000 GTM. Therefore, the fuel consumption index for Company A is:

$$\frac{24{,}703{,}611{,}000\ GTM}{48{,}007{,}195\ \text{gal}} = \frac{515\ GTM}{gal}$$

As documented previously, the fuel consumption is obtained by dividing the traffic density by the fuel consumption index. Therefore, fuel consumption for Class I line haul locomotives in Tmin County equals 2,169,025 gallons:

$$\textit{Fuel consumption} = \frac{1{,}117{,}047{,}000\ GTM}{515\ GTM\ per\ gal} = 2{,}169{,}025\ gal$$

jes/sp

TABLE 6-5. SCHEDULES 750 AND 755 FROM R-l REPORT FUR COMPANYA, 1990.

750. **CONSUMPTION** OF DIESEL FUEL (Dollars in Thousands)		
LOCOMOTIVE		
'Kind of locomotive service	Diesel	
Line No. (a)	Diesel oil (gallons) (b)	Line NO.
I . **Freight**	48,007,195	1
2. *Passenger*		2
3. Yard switching	1,186,448	3
4. Total	49,193,643	4
5. COST OF FUEL $(000)	35,786	5
6. Work **Train**	11,978	6

755. RAILROAD OPERATING STATISTICS - Concluded					
Line No.	Cross Check	Item Descriptions (a)	Freight Train	Passenger Train (c)	Line No.
		6. Gross Ton-Miles (thousands) (K)	xxxxxxx	xxxxxx	
98		6-01 Road Locomotive	3,659,794		98
		6-02 Freight Trains, Crs., Cnts., and Caboose	xxxxxxx	xxxxxx	
99		6-020 Unit Trains	1,572,037	xxxxxx	99
100		6-021 Way Trains	608,216	xxxxxx	100
101		6-022 Through Trains	20,733,165	xxxxxx	101
102		6-03 Passenger-Trains, Cm., & Cnts.			102
103		6-04 Non-Revenue	1,790,193	xxxxxx	103
104		6-05 TOTAL (lines 98-103)	28,363,405		104

From the EPA Procedures, the CO emission factor is 0.0626 lbs/gal. Class I emissions were obtained by multiplying fuel consumption by the emission factor.

$$\text{Class I emissions} = (2{,}169{,}025\ gal)\left(\frac{0.0626\ lbs}{gal}\right)\left(\frac{1\ ton}{2{,}000\ lbs}\right)$$

$$= 67.9\ \text{tons per year}$$

Therefore, 1990 Class I line haul locomotive emissions for Train County were 67.9 tons per year.

Class II and III Line Haul Locomotives--Class II and Class III emissions were also calculated by multiplying fuel consumption by an emission factor. There are only two Class II and Class III railroads in Tmin County. -Both were contacted directly to obtain fuel consumption data. Representatives from each company verbally communicated fuel consumption data for their company in Train County, which are given below:

Company B	= 57,000 gal
Company C	= 283,500 gal
Total	= 340,500 gal

As with Class I line haul locomotives, the CO emission factor from the EPA Procedures is 0.0626 lbs/gal. Class II and Class III line haul locomotive emissions were obtained by multiplying fuel consumption by the emission factor.

$$\text{Class II and III emissions} = (340{,}500\ gal)\left(\frac{0.0626\ lbs}{gal}\right)\left(\frac{1\ ton}{2{,}000\ lbs}\right)$$

$$= 10.6\ \text{tons per year}$$

Therefore, 1990 Class II and Class III line haul locomotive emissions for Train County were 10.6 tons per year.

Yard Operations--Emissions from yard opemtions were calculated by multiplying the number of yard locomotives by annual emissions per yard locomotive. Only three companies operate rail yards in Train County. Railway yard managers for Companies A, B, and C were contacted for the number of yard locomotives at each yard in Train County.

Company	Number of Yard Locomotives
A	5
B	2
C	4
TOTAL	11

According to the Procedures, the CO emission factor per locomotive is 7,375 lbs/yr.

$$\text{Yard emissions} = (11 \text{ locomotives}) \left(\frac{7{,}375 \text{ lbs}}{\text{yr}}\right) \left(\frac{1 \text{ ton}}{2{,}000 \text{ lbs}}\right)$$

$$= 40.6 \text{ tons per year}$$

Therefore, 1990 yard operations emissions for Train County were 40.6 tons per year.

Total CO Emissions for Train County

Total annual CO emissions from locomotives in Train County are shown in the second column below. Because railroad traffic is relatively constant through the year, the seasonal adjustment factor is 1.0. The annual CO emissions were divided by 365 days per year and the results are shown in the third column. The 1990 total daily CO emissions for Train County were 0.33 tons.

	Tons CO Per Year	Tons CO Per Day
Line haul - Class I	67.9	0.186
Line haul - Classes II & III	10.6	0.029
Yard Operations'	40.6	0.111
TOTAL.	119.1	0.326

SECTION 7

ON-ROAD MOBILE SOURCES

This section of the guidance document provides information and examples for reporting on-road mobile source emission estimates. The guidance is based on the reporting requirements for mobile sources as described in the EPA Requirements Documents (EPA-450/4-91-010 and EPA-450/4-91-011). The section is divided into six subsections: Introduction, VMT Estimation Procedure, Emission Factor Estimation Procedure, Summary of Emissions From On-Road Mobile Sources, References, and Appendices. The on-road mobile source section of the emission inventory report may be organized in the same manner. Each subsection is described below, along with example tables and figures, to indicate what information should be included in the base year inventory report.

7.1 INTRODUCTION

The introduction should describe the pollutants addressed, the geographical area covered, the vehicle types included, and how emission estimates were developed. The report should indicate that MOBILE4.1 was used in conjunction with vehicle miles traveled (VMT) estimates to produce emission estimates (except for California, where the EMFAC model may be used instead of MOBILE4.1).

A brief discussion of on-road emissions should be included in the introduction. This is most easily accomplished with a figure or table that summarizes emission totals for each pollutant by county or appropriate geographical area. The summary emission totals should be reported on both an annual and seasonal daily basis (ozone season, CO season, or both, where applicable). Tables 7-l and 7-2 show example summary tables.

The introduction should indicate how the on-road mobile sources sections and appendices are organized and what information they contain.

TABLE 7-1. DISTRIBUTION OF ON-ROAD MOBILE SOURCE EMISSIONS BY COUNTY: 1990 OZONE SEASON ESTIMATES

County	VOC Emissions[a] (tons/day)	NO_x Emissions (tons/day)	CO Emissions (tons/day)
County A	80	35	300
County B	50	25	250
County C	30	15	150
TOTAL	160	75	700

a VOC emission estimate includes emissions from vehicle refueling losses.

TABLE 7-2. DISTRIBUTION OF ON-ROAD MOBILE SOURCE EMISSIONS BY COUNTY: 1990 ANNUAL ESTIMATES

County	VOC Emissions[a] (tons/year)	NO_x Emissions (tons/year)	CO Emissions (tons/year)
County A	25,600	11,200	96,000
County B	16,000	8,000	80,000
County C	9,600	4,800	48,000
TOTAL	51,200	24,000	224,000

a VOC emission estimate includes emissions from vehicle refueling losses.

Lastly, the introduction should identify the primary references used for preparing the on-road mobile sources inventory. For example:

The main reference sources for preparing the highway vehicle portion of the inventory were Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources (EPA-450/4-81-026d, Revised July 1989), and User's Guide to MOBILE4.1 (EPA-AA-TEB-91-01, July 1991).

Additional references specific to each subsection on VMT estimates and MOBILE4.1 should be included in the appropriate sections of the report.

7.2 VMT ESTIMATION PROCEDURE

The subsection on VMT should begin by clearly identifying the primary source of VMT data for the nonattainment area. For most inventory areas, the source will be a transportation or planning agency.

Next, the specific procedures used to develop VMT for the inventory area should be discussed. It is not acceptable to simply state that the Department of Transportation, or a similar agency, ran a transportation planning model and provided the air agency with the VMT numbers. At a minimum, the following subjects need to be included in the VMT discussion:

- Identification of the agency responsible for developing VMT data;
- Description of the method used to estimate VMT for the nonattainment area (e.g., traffic counts, network-based model) that:
  - -- Explains how functional classifications (i.e., road types) were defined for the nonattainment area;
  - -- Explains how speed estimates were developed for each functional class;
  - -- Explains any assumptions made in developing the VMT data (e.g., applying speed estimates to roads not studied);

-- Shows how daily VMT estimates were developed by road type and vehicle class;

- How the VMT data were developed on a county basis;
- How VMT were adjusted for the appropriate peak ozone or CO season day; and
- A summary of VMT data for the nonattainment area by road type classification and by vehicle class.

Additional information presented in the inventory report will be specific to the VMT estimation procedure used.

Most states will use a VMT estimation procedure based on either traffic count data, a network-based planning model, or both. The following example describes a traffic count program.

County A Traffic Count Program

Traffic counting is done on all designated functional systems, including interstates, United States highways, state highways, county/state-aid highways, municipal state-aid streets, and county roads. All traffic count sampling data are collected in accordance with the FHWA's Highway Performance Monitoring System (HPMS) guidance, as described in the HPMS Field Manual. Certain local roads, including township roads, frontage roads, and minor roads were not included in the traffic count progmm; the VMT estimation procedures used for these roads are discussed later in this section.

Traffic counting is done on a 2-year cycle. About one-half of the counting is done in 1 year, the remaining one-half is completed the following year. Automatic traffic recording loops are installed across the roadways on which the counts are taken. Short-term counts (48 hours dumtion) are taken during the summer on weekdays. By looking at continuous counts, factors are developed, which are then applied to the 48-hour counts to obtain an average day count. These factors are described below and include seasonal adjustments and

annual updates for the base year. After these counts are factored, they are then placed on work maps and viewed in sequence to determine how accurate and reasonable they are. Once the daily traffic count estimates are prepared, they are coded and key punched before being submitted to the computer data base for storage. Summary traffic count data are provided in Appendix C, Table C-4, of this report.

A summary table of traffic count data should be included. This summary may accompany the program description or be more appropriately placed in an appendix, as in the above example.

There must be an explanation in the report of how traffic count data were used to develop daily VMT for the particular nonattainment season. If an appendix is used for this purpose, the data in the appendix must clearly tie back to the discussion in the main body of the report,

Alternatively, a State may choose to use a network-based transportation planning model to estimate VMT for the base year. The following items need to be discussed in the inventory report:

- The geographic area covered by the model inputs and for which VMT estimates were generated;
- Trip generation, including the use of appropriate base year demographic data;
- Trip distribution;
- Mode split;
- Trip assignment; and
- Model outputs, to include VMT generation and speed estimates.

It is difficult to provide specific examples for documenting the use of network-based transportation planning models because the types of models used and the manner in which they

are used can vary from state to state; however, some common elements are included in the above list.

As with traffic counts, a summary of the output from the transportation planning model should be included. An example summary table is provided in Table 7-3, which shows information from an Urban Transportation Planning System (UTPS) model run. Again, these types of tables may be placed in an appendix if they are clearly referenced in the main report.

If a network-based planning model is used to produce VMT estimates, it is critical that the report clearly explain how the VMT generated for the network region correlates to the VMT for the nonattainment area. Typically, these two areas are not identical and the report must explain how VMT is estimated for nonattainment areas not covered by the network-based model.

The description of the methodology used to estimate VMT should match the level of detail of EPA's Quality Review Guidelines for the 1990 Base Year Emission Inventories (EPA-450/4-91-022), specifically in regard to the detailed review checklist for VMT estimates. This document provides detailed review guidelines for on-road mobile sources, and the preparing agency should refer to this document when assembling the inventory report. The review checklist included in the Quality Review Guidelines document contains detailed questions regarding the development of VMT. The inventory report needs to indicate, either through discussion in the narrative or through clearly delineated references, how each of the review items were addressed. Many of the detailed review questions ask for data that may be more appropriately included in an appendix (e.g., model inputs/outputs from a transportation planning model), or through a clearly designated reference (e.g., the U.S. Census Bureau for population Data).

Regardless of which VMT estimation procedure is used, there should also be a discussion in this subsection on how VMT data were adjusted for seasonal variations. For example, the report should indicate which method was used to adjust VMT data for a typical summer weekday in an ozone nonattainment inventory. This discussion may include adjustment factors used and

dis/saf

*TABLE 7-3. **UTPS VMT** SUMMARY DATA*

1990			
Run ID	T16DHA10 T16DHZUP (reaggregrate facility data)		
Run Date	04/19/90 12/27/90		
			Survey Report Reference[a]
Base Households	74,755		(Report 4)
Base Population	202,864		(Report 4)
Base Employment	93,870		(Report 4)
Total Trips	717,137		(Report 12)
Interzonals	**658,931**	**91.9%**	
Interzonals	58,206	8.1%	

Following from UTPS special report:[b]

FACILITY TYPE[c]	VMT	% OF VMT	LINK DISTANCE	% OF DISTANCE	FREE FLOW SPEED	CONGEST SPEED
1	67,427	1.9%	10.5	0.6%	28.6	25.8
2	340,858	9.4%	74.3	4.5%	43.6	37.4
3	125,080	3.4%	53.4	3.2%	31.2	29.0
4	841,445	23.2%	574.8	34.7%	39.3	37.1
5	523,129	14.4%	650.6	39.2%	15.0	15.0
6	769,925	21.2%	95.3	5.7%	37.4	31.1
7	683,288	18.8%	71.8	4.3%	51.9	48.7
8	147,590	4.1%	64.7	3.9%	48.3	45.8
9	132,144	3.6%	63.1	3.8%	34.2	31.5
TOTAL UTPS NETWORK	3,630,886		1,659		37.9	34.5

[a] See the report description on VMT estimation procedures and the list at the end of Section 6 for complete references to documentation containing demographic information used for this UTPS model run.

[b] See the report description on VMT estimation procedures for a detailed discussion of UTPS model outputs and reports used for this inventory.

[c] Descriptions for each of the coded facility types are given on p. 31 of the inventory report.

an example of how a factor was applied to the VMT data. If no seasonal adjustment factors were used, the report should indicate the rationale for this decision.

Summary VMT data must be provided in the report, and are required to be presented by road type classification and by vehicle class. An example showing summary VMT data by vehicle class and road type is shown in Table 7-4. In this example, VMT has also been broken down by rural versus urban travel to match the traffic counting program used. Because there are specific approaches to estimating VMT, the preparing agency may need to report other summary **data** (e.g., traffic count data for each nonattainment county) or information related to that specific approach, In order to facilitate review of the report, it is more appropriate to include summary VMT **data** tables in the narrative section of the inventory and to clearly reference more detailed data tables and additional information in an appendix.

7.3 EMISSION FACTOR ESTIMATION PROCEDURE

This subsection of the inventory report should describe the **use** of MOBILE4.1 (or the EMFAC model for California) to develop emission factors for on-road mobile sources. At a minimum, this subsection must include:

- Identification of the emission factor model used (MOBILE4.1 or latest version) and the agency responsible for running it;
- Explanation of the development of all MOBILE4.1 inputs;
- Explanation of the MOBILE4.1 output and which emission factors were used (e.g., were refueling emission factors used in addition to exhaust emission factors?);
- A summary of the emission factors that were developed for each vehicle class and road type by county; and
- Explanation of how the MOBILE4.1 generated emission factors were combined with VMT data to produce emission estimates for on-road mobile sources.

Each of the items should be presented in the order shown above.

jes/sip

TABLE 7-4. DAILY VMT FOR LIGHT-DUTY GASOLINE VEHICLES IN NONATTAINMENT COUNTIES

County	1000 VMT/day[a]						
	Total	Interstate	Principal Arterial	Minor Arterial	Collector	Local	Collector/ Local
County A: Rural	3,402	1,054	571	249	682	846	
Urban	10,981	2,291	7,032	1,359			299
County B: Rural	1,017	134	20	14	609	239	
Urban	2.073	641	939	339			155
County C: Rural	1,348	515	137	21	320	355	
Urban	708	79	387	173			70
County D: Rural	1,086	370	134	61	266	255	
Urban	910	125	474	223			89
County E: Rural	1,368	0	415	0	547	406	
Urban	323	8	252	61			2
County F: Rural	626	0		0	412	214	
Urban	194	0	I 15: I 17				23
TOTAL	24,038	5,217	10,515	2,517	2,336	2,315	638

a Represents an average day during the ozone season as defined in Section 1 of this report.

Emission Factor Model

This subsection should begin with an overview identifying the use of MOBILE4.1, the pollutant(s) for which emission factors were developed, and a description of how MOBILE4.1 emission factors were used for the on-road mobile sources inventory. Also, the agency who was responsible for running the MOBILE4.1 model should be identified here.

The MOBILE4.1 program is subject to future revisions, so the inventory report should describe the which version was used to prepare on-road emission estimates. The reporting requirements for using the EMFAC model in California are not explained in this report. The EPA's Office of Mobile Sources should be contacted for further information.

Development of Model Inputs

Following the overview of how MOBILE4.1 was used, the report should then discuss the development of MOBILE4.1 input data. This is most effectively accomplished by identifying and describing, item for item, the control flag settings and input data records as they appear in the MOBILE4.1 input file. Summary tables of each of the control flag settings and data input records should be provided. Tables 7-5 through *7-8* give examples of what the summary tables for MOBILE4.1 input data records might look like.

Descriptions of each of the MOBILE4.1 control flag settings and how input data records were developed need to be included in the inventory report. An example description for an input record in the one-time data section, minimum and maximum ambient temperatures, is given below.

Minimum and Maximum Temperatures--The minimum and maximum daily temperatures are important inputs, primarily for calculating VOC emissions, because they significantly affect evaporative emission rates. To determine the minimum and maximum temperature for input to MOBILE4.1, ambient temperature data were reviewed for those days

TABLE 7-5. MOBILE4.1 CONTROL FLAG SETTINGS

Record Number	Variable Name	Content and Code Used
1.	PROMPT	1 = No prompting, vertical format
2.	PROJID	80 characters for title
3.	TAMFLG	1 = Use MOBILE 4.1 rates
4.	SPDFLG	1 = One speed for all vehicle types
5	VMFLG	1 = Use MOBILE 4.1 VMT mix
6.	MYMRFG	1 = Use MOBILE 4.1 values for annual mileage accumulation/registration distribution
7	NEWFLG	1 = Use MOBILE 4.1 basic emission rates
8.	IMFLAG	2 = I/M program assumed
9.	ATPFLG	1 = No corrections
10.	ATPFLG	1 = No ATP assumed
11.	RLFLAG	5 = No refueling emission factors calculated
12.	LOGFLG	2 = One LAP record input for all scenarios
13.	TEMFLG	1 = MOBILE 4.1 calculates temperatures to be used in correction of emission factors from input values of minimum and maximum ambient daily temperature; value read as input for ambient temperature is over-ridden by calculated values
14.	OUTFMT	4 = 80 column descriptive
15.	PRTFLG	4 = All three pollutants
16.	IDLFLG	1 = No idle emission factors
17.	NMHFLG	3 = VOC emission factors
18.	HCFLAG	3 = Sum and components printed, plus evaporative and refueling emission factor information

*TABLE 7-6. **SUMMARY** OF **I/M** PROGRAM **DESCRIPTIVE** INPUT RECORD*

Field	Content, Variable Name, Codes	Values Used
1	Program start year (1 CYIM)	86
2	Stringency level (1 STRIN)	17
3	First model year (MODYR1)	68
4	Last model year (MODYR2)	20
5	Waiver rate for pre-1981 model year vehicles (WAIVER (1)) (percent)	21.9
6	Waiver rate for 1981 and later model year vehicles (WAIVER (2)) (percent)	4.58
7	Compliance rate (CRIM) (percent)	80
8	Program type (INTYP)	1 = Centralized
9	Inspection frequency (IFREQ)	1 = Annual
10	Vehicle types subject to inspections (ILDT (4))	1 LDT(1)-LDGV Y 1LDT(2)-LDGT1 Y 1LDT(3)-LDGT2 Y 1LDT(4)-HDGV N
11	Test type (ITEST)	1 = Idle test
12	Flag to indicate whether alternative I/M credits are to be input by user (NUDATA (2))	NUDATA(l) - for Tech I-II-I NUDATA(2) - for Tech IV + -1 1 = Use MOBILE 4.1 I/M credits

*TABLE 7-7. **SUMMARY** OF THE LOCAL AREA PARAMETER RECORD*

Field	Content, Variable Name, Code	Values Used
1	Scenario name (SCNAME)	Optional
2	Minimum daily temperature (TEMMIN), in °F	66
3	Maximum daily temperature (TEMMAX), in °F	95
4	"Period 1" RVP (RVPBAS)	11.5
5	"Period 2" RVP (IUSRVP)	9.0
6	"Period 2" start year (IUSESY)	89
7	Effect of oxygenated fuel on exhaust CO to be modeled	2

*TABLE 7-8. **SUMMARY** OF THE SCENARIO RECORDS*

Field	Content, Variable Name, Code	Values Used
1	Region for which emission factors are to be calculated (IREJN)	1 = Low altitude
2	Calendar year of evaluation (CY)	*90*
3	Average speed to be used in emission factor calculations (SPD or PSD(8))	1 = One speed for all vehicle types (Corm DOT speed classes)
4	Ambient temperature (AMBT) in °F	Use 85 for typical summer day and 30 for typical winter day
5	Operating mode fractions (PCCN, PCHC, PCCC), in % of VMT accumulated by: PCCN - Noncatalyst vehicles in cold start mode PCHC - Catalyst equipped vehicles in hot start mode PCCC - Catalyst equipped vehicles in cold start mode	 20.6 27.3 20.6

during 1988, 1989, and 1990 when ambient ozone levels in the nonattainment area exceeded the NAAQS.

The average minimum and maximum tempemtures on these days were then calculated. The average minimum and maximum tempemtures for days where ambient air quality exceeded the NAAQS were 71 °F and 95°F, respectively.

Some of the control flag settings in MOBILE4.1 allow for the use of default values- from the program. If a default value is selected, the report should indicate this and provide a brief explanation for using the default value. An example description for the use of a default value is provided below.

Annual Mileage Accumulation Rates/Registration Distributions--Based on the guidance in the MOBILE4.1 Users's Guide, mileage accumulation rates included in MOBILE4.1 were used for this draft inventory. Also, because of a lack of specific 1990 registration data for the inventory area, the MOBILE4.1 default values for national average registration distributions were used. The control flag MYMRFG was therefore set to 1, indicating that default MOBILE4.1 mileage accumulation rates and registration distributions were used.

Following the sequence of the MOBILE4.1 input file will ensure that all input parameters and selections are properly described in the report.

Model Inputs

The inventory report should describe the use of the applicable model outputs, i.e., the various emission factors that are generated from the program. MOBILE4.1 can develop exhaust emission factors for VOC, NO,, and CO and also specific evaporative emission factors for VOCs. The report must identify which of these factors were used in developing emission estimates.

Summary of Emission Factors

A summary table should be provided that shows the emission factors developed for each vehicle class and road type. Emission factors are usually generated for specific road types (e.g., interstates, arterials) by using the associated speeds for these roads when running the MOBILE4.1 program. An example of how this summary table might be presented is shown in Table 7-9. The example table shows daily VMT data, associated speed estimates, and MOBILE4.1 emission factors for each road type by county, along with the calculated emissions for each pollutant.

Emission Estimates

The type of summary table shown in the example in Table 7-9 brings together the specific components used to calculate on-road mobile source emission estimates and, therefore, facilitates a review of these calculations. Accompanying this table should be a detailed description of the MOBILE4.1 emission factors that were used for each pollutant and example calculations of how they were combined with VMT data to estimate emissions. Following is an example description for VOC emission estimates:

VOC Emissions--MOBILE4.1 was used to generate VOC emission factors for each vehicle class by county in the nonattainment area. The VOC emission factor selected from the MOBILE4.1 output includes exhaust and evapomtive emissions (excluding emissions for vehicle refueling losses,. which are discussed separately below). Daily VMT (DVMT) for the ozone season was then multiplied by the appropriate VOC emission factor for each vehicle class, by county, to calculate VOC emissions on a kg/day basis. An example calculation for County A is given below:

2,023,250	x	4.78	=	9,671
(DVMT)		*(MOBILE 4.1 Emission factor in g/mile)*		*(VOC emissions in kg/day)*

*TABLE 7-9. VMT, SPEED, AND **MOBILE** 4.1 EMISSION FACTORS WITH CALCULATED EMISSIONS FOR LIGHT-DUTY GASOLINE VEHICLES*

County	DVMT	MPH	GR/MI[a] VOC	KG/Day[b] VOC	GR/MI CO	KG/Day[b] CO	GR/MI NO_x	KG/Day[b] NO_x
Interstate								
A	2,023,250	50.2	4.78	9,671	12.13	24,542	2.58	5,220
B	1,771,233	47.8	4.81	8,520	12.49	22,123	2.50	4,428
C	1,017,645	46.2	4.84	4,925	12.76	12,985	2.46	2,503
D	3,248,734	42.1	4.92	15,984	13.64	44,313	2.39	7,764
E	3,850,952	38.6	5.00	19,255	14.72	56,686	2.34	9,011
Principal Arterial								
A	4,383,143	25.0	5.65	24,765	23.09	101,207	2.35	10,300
B	3,581,566	32.1	5.24	18,767	17.77	63,644	2.31	8,273
C	3,515,034	18.2	6.28	22,074	31.31	110,056	2.45	8,612
D	5,635,860	19.1	6.17	34,773	29.97	168,907	2.43	13,695
E	5,992,872	18.0	6.30	37,755	31.63	189,555	2.46	14,742

a VOC **MOBILE** 4.1 emission factor for exhaust and evaporative emissions excluding refueling losses.
b All emissions are presented in kg per ozone season day.

A similar discussion for each applicable pollutant should be included in this subsection. The most recent EPA guidance recommends using the MOBILE4.1-generated emission factor for vehicle refueling losses to estimate emissions for this evaporative source. Previously, AP-42 emission factors were used to estimate these emissions and they were often included under the area source section of the inventory report. Because the emission factors for vehicle refueling losses are now obtained through MOBILE4.1, it is more appropriate to place the discussion and summary of these emissions in the on-road mobile sources section of the inventory report.

The refueling emission factors generated by MOBILE4.1 are given in units of grams-per-mile or grams-per-gallon, depending on the user-selected setting for the HCFLAG in the input file. Whichever format is selected, the inventory report should summarize the refueling emission factors generated for each nonattainment county, the throughput of gasoline or VMT (depending on the units of the emission factor), and the resulting emissions calculated for each county.

Because the refueling emission factor is based on the Reid Vapor Pressure (RVP) of the gasoline used and the temperature for the nonattainment area, it is not necessary to break down refueling emissions by road type. However, MOBILE4.1 refueling emission factors do vary by vehicle type and, thus, emission factors and emission summaries will need to be reported by vehicle type. An example of a summary table that can be used for reporting emissions from refueling losses based on MOBILE4.1 emission factors is shown in Table 7-10.

TABLE 7-10. REFUELING LOSS EMISSION FACTORS AND CALCULATED EMISSIONS FOR LIGHT-DUTY GASOLINE VEHICLES

County	Gasoline Use[a] (thousands of gals/day)	MOBILE4.1 VOC Refueling Loss Emission Factor (g/gals)	VOC Emissions from Refueling Losses (kg/day)
A	300	1.84	552
B	450	1.75	787
C	375	1.80	675

[a] Gasoline use based on State gasoline sales data apportioned to county level according to EPA's Procedures for the Preparation of Emissions Inventories for Carbon Monoxide and Precursors of Ozone, Volume I: General Guidance for Stationary Sources, p. 4-6.

The source of gasoline throughput data or VMT should be clearly referenced in describing the calculations of emissions from refueling losses. The daily and annual emission totals from vehicle refueling losses may be included in the summary totals for on-road mobile sources at the beginning of this section or reported separately as a distinct category. Either way, the inventory report must clearly state how these emissions are reported as part of the total VOC emissions for the nonattainment area.

7.4 SUMMARY OF EMISSIONS FROM ON-ROAD MOBILE SOURCES

This subsection should present the calculated emissions in summary form by vehicle class, by pollutant, and by county. An example of how this summary may be presented is provided in Table 7-11. Any assumptions, adjustments, or deficiencies in developing the summary emission totals should be clearly explained here.

7.5 REFERENCES

At the end of the narrative section for on-road mobile sources, there should be a complete reference list. All reference sources, including any memoranda, telecons, or other reports that are not included in the inventory **but** were used for preparing on-road emission estimates must be clearly referenced in the narrative section and included in this list. Many of the review items in EPA's Quality Review Guidelines (EPA-450/4-91-022) require that specific information be included in the inventory report or that it be clearly referenced. A complete and accurate reference list is a crucial part of the documentation for an inventory report, particularly for the on-road mobile source category, where there may be a number of different agencies involved and various information sources.

7.6 APPENDICES

It is recommended that appendices be used to organize detailed data tables and files associated with the VMT and MOBILE4.1 documentation efforts. All information that is placed

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TABLE 7-11. DAILY ON-ROAD MOBILE SOURCE NO_x EMISSIONS BY ROAD TYPE AND VEHICLE TYPE

County	Road Type	NO_x Emissions[a] (tons/ozone season day) Vehicle Type[b]								
		LDGV	LDGT1	LDGT2	MDGV	LDDV	LDDT	HDDV	MC	Total
A	Interstate	3.8	0.8	0.6	0.4	0.1	0.0	2.6	0.0	8.3
	Principal Arterials	10.4	2.3	1.6	0.7	0.2	0.1	5.5	0.1	20.8
	Minor Arterials	2.2	0.5	0.3	0.2	0.0	0.0	1.2	0.0	4.4
	Major Collectors	0.9	0.2	0.1	0.1	0.0	0.0	0.5	0.0	1.9
	Minor Collectors/Local Streets	1.5	0.3	0.2	0.1	0.0	0.0	1.0	0.0	3.2
	TOTAL	18.7	4.1	2.9	1.4	0.3	0.1	10.8	0.1	38.5
B	Interstate	2.1	0.5	0.3	0.2	0.0	0.0	1.5	0.0	4.7
	Principal Arterials	4.0	0.9	0.6	0.3	0.1	0.0	2.1	0.0	8.1
	Minor Arterials	1.2	0.3	0.2	0.1	0.0	0.0	0.7	0.0	2.5
	Major Collectors	2.9	0.7	0.5	0.2	0.0	0.0	1.6	0.0	6.0
	Minor Collectors/Local Streets	2.5	0.5	0.4	0.2	0.0	0.0	1.5	0.0	5.2
	TOTAL	12.8	2.9	2.1	0.9	0.2	0.1	7.4	0.1	26.4
C	Interstate	0.8	0.2	0.1	0.1	0.0	0.0	0.5	0.0	1.7
	Principal Arterials	1.9	0.4	0.3	0.1	0.0	0.0	1.0	0.0	3.8
	Minor Arterials	0.4	0.1	0.1	0.0	0.0	0.0	0.2	0.0	0.9
	Major Collectors	0.5	0.1	0.1	0.0	0.0	0.0	0.3	0.0	1.0
	Minor Collectors/Local Streets	0.5	0.1	0.1	0.0	0.0	0.0	0.3	0.0	1.1
	TOTAL	4.1	0.9	0.7	0.3	0.1	0.0	2.4	0.0	8.5

[a] Emission values of 0.0 indicate that daily emissions are less than 100 lbs/day.

[b] Vehicle type abbreviations:

LDGV = Light-duty gasoline vehicles
LDGT1 = Light-duty gasoline trucks 1 (< 6000 lbs GVW)
LDGT2 = Light-duty gasoline trucks 2 (6001 to 8500 lbs GVW)
HDGV = Heavy-duty gasoline vehicles
LDDV = Light-duty diesel vehicles
LDDT = Light-duty diesel trucks
HDDV = Heavy-duty diesel vehicles
MC = Motorcycles

in an appendix must be clearly labeled and referenced in the narrative section of the report where it applies. This type of reporting format presents the information in a concise manner, avoids disjointed presentation of material, and facilitates a multi-level review of the inventory report, which is consistent with EPA's Quality Review Guidelines (EPA-450/4-91-022).

Some of the items that may be appropriately placed in appendices include:

- MOBILE4.1 Input/Output files. Example input and output files from MOBILE4.1 are shown in Tables 7-12 and 7-13, respectively. All input and output files from MOBILE4.1 that were used in preparing on-road emission estimates must be included in the inventory report.

- Traffic count data used for VMT estimates.

- Input/output data from a network-based travel demand model.

- Tables or calculations associated with specific MOBILE4.1 records (e.g., temperature determination, RVP determination). Table 7-14 presents an example summary table of temperature data that can be used for documenting minimum and maximum temperature determination for input to the MOBILE4.1 model.

- Printouts of spreadsheets used for calculating emissions from VMT data and emission factors.

TABLE 7-12. EXAMPLE MOBILE4.1 INPUT FILE

```
1    '      PROMPT
MOBILE4.1 UG Example 4: OUTFMT  = 4  (portrait  (80  column)  descriptive  output  format)
1           TAMFLG
1           SPDFLG
1           VMFLAG
1           MYMRFG
1           NEWFLG
1           IMFLAG
1           ALHFLG
1           ATPFLG
3           RLFLAG
1           LOCFLG  -  read in local area parameters as 2nd req sc rec
1           TEMFLG  -  calculate   exhaust   temperatures
4           OUTFMT
4           PRTFLG
1           IDLFLG
1           NMHFLG
2           HCFLAG  -  print  HC  components
89  2221    IOBMY, IVOB
1  80 19.6  75.0  20.6  27.3  20.6                    1st req sc rec: IREJN,ICY,SPD(1),AMBT,PCCN,PCHC,PCCC'
San  Francisco CA  C  60.   84.  11.5  11.5  68     LAP rec:  SCNAME,RVPAST,TEM MIN,TEMMAX,RVPBAS,RVPIUS,IUSESY
1  88 19.6  75.0  20.6  27.3  20.6                    1st req sc rec: IREJN,ICY,SPD(1),AMBT,PCCN,PCHC,PCCC
San  Francisco  CA  C  60.   84, 11.5 11.5. 88     LAP rec: SCNAME,RVPAST,TEMMIN,TEMMAX,RVPBAS,RVPIUS,IUSESY
1  90 19.6  75.0  20.6  27.3  20.6                    1st req sc rec: IREJN,ICY,SPD(1),AMBT,PCCN,PCHC,PCCC
San  Francisco CA  C  60.   84.  11.5  11.5  88     LAP rec: SCNAME,RVPAST,TEMMIN,TEMMAX,RVPBAS,RVPIUS,IUSESY
1  00 19.6  75.0  20.6  27.3  20.6                    1st req sc rec: IREJN,ICY,SPD(1),AMBT,PCCN,PCHC,PCCC
San  Francisco  CA  C  60.   84.  11.5  11.5  88     LAP rec: SCNAME,RVPAST,TEMMIN,TEMMAX,RVPBAS,RVPIUS,IUSESY
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000~~~~~~~~~~
```

TABLE 7-13. EXAMPLEMOBZLE4.1 OUTPUTFZLE

```
mBILE4.1 UG Example 4: OUTFMT = 4 (portrait (80 column1 descriptive output form
MOBILE4.1(4Nov91)
0Total HC emission factors include evaporative HC emission factors.
0
0Cal. Year: 1960          Region: Low          Altitude:  500. Ft.
                I/M Program: No Ambient Temp: 78.1 I 76.1 I 78.1 F
              Anti-tam. Program: NO Operating Mode: 20.6 / 27.3 / 20.6
0San Francisco CA
                Minimum Temp: 60. (F)  Maximum Temp: 04. (F)
                Period 1 RVP: 11.5 Period 2 RVP: 11.5 Period 2 Yr: 1988
0Veh. Type:  LDGV  LDGT1  LDGT2  LDGT  HDGV  LDDV  LDDT  HDDV  MC  All Veh
+
 Veh. Spd.: -19.6  19.6  19.6  19.6  19.6  19.6  -19.6  19.6  ET--
   VW Mix:  0.666  0.146  0.070  0.031  0.005  0.001  0.049  0.011
0Composite Emission Factors (Gm/Mile)
 Total EC:  8.39  9.06  16.64  11.49  29.66  0.66  0.99  5.40  9.71  9.54
 Exhst HC:  4.34  4.95  7.64  5.00  14.06  0.66  0.99  5.40  6.98  5.03
 Evap. HC:  2.44  2.51  6.06  3.65  12.29  2.29  2.87
 Refuel HC:  0.37  0.43  0.44  0.43  0.61  0.37
 Runing HC:  1.12  1.07  2.20  1.43  2.51  1.16
 Rsting HC:  0.12  0.10  0.10  0.10  0.16  0.44  0.11
 Exhst CO:  54.96  60.64  82.04  67.50  226.27  1.56  2.13  16.09  33.63  60.49
 Exhst NOX:  3.11  3.25  4.66  3.71  7.39  1.51  1.96  29.89  0.47  4.64
-------------------------------------------------------------------------------
0Cal. Year: 1988          Region: Low          Altitude:  500. Ft.
                I/M Program: No Ambient Temp: 78.1 / 78.1 / 70.1 F
              Anti-tam. Program: No Operating Hods: 20.6 / 27.3 / 20.6
0San Francisco CA
                Minimum Temp: 60. (F)  Maximum Temp: 64. (F)
                Period 1 RVP: 11.5 Period 2 RVP: 11.5 Period 2 Yr: 1988
0Veh. Type:  LDGV  LDGTl  LDGT2  LDGT  HDGV  LDDV  LDDT  BDDV  MC  All Veh
+
 Veh. Spd.: -19.6  19.6 i - K - - E -  1 9 . 6  19.6  19.6  19.6
   VMT Mix:  0.637  0.159  0.076  0.035  0.013  0.003  0.068  0.009
0Composite Emission Factors (Gm/Mile)
 Total HC:  4.66  5.61  a.46  6.54  17.93  0.62  0.79  3.25  6.36  5.43
 Exhst EC:  2.27  3.14  4.18  3.47  6.91  0.62  0.79  3.25  3.07  2.76
 Evap. HC:  1.25  1.35  2.82  1.83  0.40  2.65  1.54
 Refuel EC:  0.26  0.32  0.33  0.33  0.54  0.26
 Runing HC:  0.78  0.70  1.04  0.81  1.86  0.76
 Rsting HC:  0.12  0.10  0.10  0.10  0.15  0.44  0.11
 Exhst CO:  29.07  36.09  47.90  41.28  128.32  1.57  1.72  13.70  22.71  33.83
 Exhst NOX:  1.70  2.05  2.67  2.25  5.93  1.57  1.77  20.94  0.80  3.26
-------------------------------------------------------------------------------
0Cal. Year: 1990          Region: Low          Altitude: 500. Ft.
                I/M Program: No Ambient Temp: 78.1 I 70.1 I 78.1 F
              Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6
0San Francisco CA
                Minimum Temp: 60. (F)  Maximum Temp: 04. (F)
                Period 1 RVP: 11.5 Period 2 RVP: 11.5 Period 2 Yr: 1986
0Veh. Type:  LDGV  LDGT1  LDGT2  LDGT  HDGV  LDDV  LDDT  HDDV  MC  All Veh
+
 Veh. Spd.:  19.6  19.6  19.6  19.6  19.6  19.6  19.6  KG---  19.6  19.6
   VMT Mix:  0.626  0.171  0.076  0.035  0.009  0.002  0.073  0.008
0Composite Emission Factors (Gm/Mile)
 Total EC:  4.09  4.88  7.14  5.56  14.57  0.69  0.93  2.87  5.93  4.71
 Exhst HC:  1.91  2.71  3.56  2.97  5.54  0.69  0.93  2.87  2.57  2.36
 Evap. HC:  1.10  1.16  2.29  1.51  6.64  2.91  1.32
 Refuel EC:  0.22  0.27  0.26  0.27  0.53  0.22
 Runing EC:  0.75  0.65  0.91  0.73  1.52  0.70
 Rsting HC:  0.11  0.09  0.10  0.09  0.14  0.44  0.10
 Exhst CO:  25.23  31.50  40.33  34.23  104.13  1.67  1.90  13.03  21.95  29.01
 Exhst NOX:  1.44  1.79  2.20  1.94  5.68  1.63  1.67  19.45  0.62  3.02
```

*TABLE 7-14. DAILY MAXIMUM AND MZNZMUM TEMPERATURES FOR OZONE **EXCEEDANCE** DAYS*

Month	Day	Daily Maximum Temperature (°F)	Daily Minimum Temperature (°F)	Year
6	25	93	71	1987
7	7	98	73	1987
7	14	95	73	1987
7	16	95	85	1987
7	21	102	72	1987
7	28	92	73	1987
8	1	95	73	1987
7	20	96	69	1988
7	21	96	72	1988
7	22	96	73	1988
7	24	98	76	1988
7	25	99	76	1988
8	5	96	74	1988
8	21	95	69	1988
6	1	91	67	1989
6	8	93	68	1989
6	16	91	63	1989
6	17	90	69	1989
6	21	94	70	1989
6	22	96	73	1989
7	7	94	65	1989
7	8	98	71	1989
7	9	91	68	1989
7	10	93	75	1989
7	15	97	74	1989
8	18	101	73	1989
9	14	89	71	1989
Averages		94.96	71.33	

SECTION 8

BIOGENIC SOURCES

The EPA now requires that VOC emissions from biogenic sources be estimated and reported for base year emission inventories in moderate, serious, severe, and extreme ozone nonattainment areas. States have been provided with a PC-based model, PC-Biogenic Emissions Inventory System (PCBEIS), to estimate biogenic non-methane hydrocarbon emissions from biogenic sources. The model estimates emissions by county on an hourly basis. Results from this model are used as part of the typical operating day emissions for the ozone season. Should a State choose not to use the PCBEIS model, it must describe its alternative method in its Inventory Preparation Plan' (IPP) and have the method approved by EPA, as noted in the EPA SIP Requirements Document (EPA-450/4-91-010).

8.1 MODEL INPUTS

The PCBEIS program accesses information about crop acreage and land use from a data file that comes with the program and assigns emission rates to different land use types. The model estimates emissions based on calculations using crop acreage and leaf biomass, so it can only be used for the summer growing season. To run the program, users need to provide location data, ozone concentration data, and hourly meteorological data.

8.1.1 Location Data

The following location data must be inputted to the model:

- County name;
- County FIPS code; and
- Latitude and longitude.

8.1.2 Ozone Data

The typical operating day to be run in the model is selected by first determining the 10 days with the highest ozone concentration levels out of the last three years of monitoring data. If there are not three years of monitoring data, the 10 days must be taken from whatever data are available. Out of the 10 days with the highest ozone levels, the day with the fourth highest temperature is selected as the typical ozone season day to be inputted to PCBEIS. The date, ozone level, and temperature of the top 10 days, along with the day selected as the typical operating day, should be documented in the inventory report, as shown in the example in Table 8-1.

TABLE 8-l. TYPICAL OPERATING DAY FOR PCBEIS

MODEL RUN FOR OZONEVILLE, NC

TOP TEN OZONE DAYS - FOURTH HIGHEST TEMPERATURE DAY NOTED WITH (*)

Date	*Ozone* Level (ppm)	Maximum Temperature (F)
6/24/88	0.112	93
6/25/90	0.109	88
7/3/90	0.107	92
8/10/89	0.105	87
9/4/89	0.102	91
6/30/88	0.097	90 *
8/5/90	0.09s	88
8/12/89	0.094	84
7/17/90	0.094	87
6/6/88	0.088	85'

8.1.3 Meteorological Data

Once the typical operating day has been determined, more detailed meteorological data must be obtained. PCBEIS requires hourly data for cloud cover, relative humidity, wind speed, and temperature. A good source for this information is the database that the National Weather Service maintains in Asheville, North Carolina, but there are other sources, such as local airports. The National Weather Service database lists hourly and special observations from stations around the country. An example of meteorological data from the National Weather Service for a day in Buffalo, NY, is shown in Table 8-2. Meteorological data from any source must be referenced and included in the inventory report. Wind speed and temperature must be converted to-meters-per second and degrees centigrade. Units of measure conversions should be documented as well, as shown in the example in Table 8-3.

8.1.4 Special Cases

There will be cases where a standard model run will not provide the required estimates. For instance, only part of a county may be covered in the inventory, or land use is drastically different from the laud use categories in PCBEIS.

There are two methods for modifying a standard model run. The first method involves manipulating the model results only. The second method requires changing the county land use database, and is more complicated. However, the second method, if based on recent and accurate land use data,, will result in more reliable output.

In the first method, the program is run for the appropriate day, and a percentage of the emissions proportional to the area of the county covered in the inventory is used. This method assumes that vegetation is uniformly distributed, and is used when the spatial distribution of vegetation in the county is unknown. This assumption of uniform vegetation distribution must be noted in the inventory report. An example of how this method should be documented is shown in Table 8-4.

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TABLE 8-2. NATIONAL WEATHER SERVICE METEOROLOGICAL DATA FOR BUFFALO, NY

HF1-108 (1-85)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

SURFACE WEATHER OBSERVATIONS

STATION: BUFFALO, NY

DATE: JULY 1, 1991

TO CONVERT LST TO GMT: ADD 05 hrs. SUBTRACT ___ hrs

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (deg F) 18	WET BULB (deg F) 19	RELATIVE HUMIDITY (%) 20	TOTAL SKY COVER 21	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT 22	LOWEST LAYER TYPE 23	LOWEST LAYER HGT 24	SECOND LAYER AMT 25	SECOND LAYER TYPE 26	SECOND LAYER HGT 27	SUM TOTAL 28	THIRD LAYER AMT 29	THIRD LAYER TYPE 30	THIRD LAYER HGT 31	SUM TOTAL 32	FOURTH LAYER AMT 33	FOURTH LAYER TYPE 34	FOURTH LAYER HGT 35	TOTAL OPAQUE 36	PRESSURE TENDENCY 37	NET 3HR CHANGE (Ins) 38	SUNSHINE (MIN) 39	PRECIPITATION (Ins) 40	HR.
00 50	29230	57.0	53.8	80.5	0															0	2			.00	00-01
01 50	29235	54.0	52.4	89.7	0															0				.00	01-02
02 50	29225	54.0	51.4	80.3	3	2	AC	80	1	CI	250	3								2				.00	02-03
03 50	29225	53.0	50.9	86.4	6	2	AC	80	4	AC	E130	6								5	6	005		.00	03-04
04 50	29245	53.0	50.4	86.4	8	3	AC	80	5	AC	E130	8								7				.00	04-05
05 50	29255	56.0	52.3	77.5	8	3	AC	80	5	AC	E120	8								7				.00	05-06
06 50	29265	58.0	54.2	77.7	9	2	AC	90	7	AC	E120	9								8	2	040		.00	06-07
07 50	29275	65.0	58.2	65.3	4	3	AC	120	1	CI	230	4								3				.00	07-08
08 50	29270	70.0	60.7	57.0	7	3	AC	120	4	CI	250	7								3				.00	08-09
09 50	29270	71.0	59.1	47.6	8	0	CU	35	3	AC	120	3	5	CI	250	8				2	1	005		.00	09-10
10 50	29270	73.0	59.0	41.0	9	0	CU	35	3	AC	120	3	6	CI	250	9				4				.00	10-11
11 50	29270	75.0	58.9	35.8	8	0	CU	40	2	AC	120	2	6	CI	250	8				3				.00	11-12
12 50	29255	75.0	59.3	37.1	5	0	CU	35	2	AC	100	2	3	CI	250	5				2	8	015		.00	12-13
13 50	29220	76.0	58.8	33.3	3	1	AC	130	2	CI	250	3								1				.00	13-14
14 50	29215	78.0	59.6	31.1	3	2	AC	130	1	CI	250	3								2				.00	14-15
15 50	29195	78.0	58.8	29.8	4	3	AC	130	1	CI	250	4								3	7	060		.00	15-16
16 50	29195	75.0	58.0	33.2	8	8	AC	E130												6				.00	16-17
17 50	29180	73.0	56.4	32.9	7	4	AC	110	3	AC	E130	7								6				.00	17-18
18 50	29185	71.0	55.2	33.9	9	2	ACCAS	85	4	AC	E110	6	3	AC	150	9				8	7	010		.00	18-19
19 50	29190	69.0	54.4	34.3	9	2	ACCAS	85	4	AC	M110	6	3	AC	150	9				8				T	19-20
20 50	29190	68.0	54.0	37.5	8	0	ACCAS	85	6	AC	M110	6	2	AC	150	8				8				.00	20-21
21 50	29190	66.0	52.3	37.2	3	3	AC	110												0	1	005		.00	21-22
22 51	29190	65.0	51.9	38.6	7	4	AC	100	3	AC	E130	7								7				.00	22-23
23 50	29170	65.0	52.3	40.1	9	3	AC	95	4	AC	E130	7	2	CI	250	9				7				.00	23-24

SYNOPTIC OBSERVATIONS

TIME (GMT) 41	TIME (LST) 42	NO. 43	PRECIP (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX TEMP deg F 47	MIN TEMP deg F 48	PREC ORIG 49	STATE OF GRND. 50	51	52	53	54	55	SOIL TEMP. 56	57	58
	MID. TO 0047		0.00	0.0		60	57										
	0047	1	0.00	0.0	0	71	57										
	0647	2	0.00	0.0	0	58	52										
	1247	3	0.00	0.0	0	77	58										
	1847	4	0.00	0.0	0	79	71										
	MID.		T	0.0	0	71	65										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0047	0647	1247	1847
ATT. THERM. 60				
OBSRVD BAR. 61				
TOTAL CORR. 62				
STA. PRESS. 63				
BAROGRAPH 64	29.235	29.250	29.245	29.195
BAR. CORR. 65	-.005	+.015	+.010	-.010

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24HR MAX TEMP deg F 66	24HR MIN TEMP deg F 67	24HR PRECIP (Ins) 68	24HR SNOW FALL (Ins) 69	SNOW DEPTH (Ins) 70	PEAK WIND SPD (Kts) 71	PEAK WIND DIR 72	PEAK WIND TIME (LST) 73	ICE ON WATER (Ins) 74	FROZEN GRND (Ins) TOP 75	FROZEN GRND (Ins) BASE 76	RIVER GAGE 77	SKY COVER SA-SS 78	SKY COVER MN-MN 79	WATER EQUIV (Ins) 80	81
79	52	T	0.0	0	15	NE	1728					7	6		

WEATHER & OBSTRUCTIONS TO VISION

TYPE 82	BEGAN 83	ENDED 84	TYPE 86	BEGAN 87	ENDED 88
RW-	1914	1919			

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

TIME: SUNRISE 0439 SUNSET 1958

TOTAL SUNSHINE (MIN) 629 | % OF POSSIBLE SUNSHINE 69 | CHARACTER OF SUNRISE CLOUDY | CHARACTER OF SUNSET CLOUDY

FASTEST OBSERVED 1-MINUTE WIND SPEED (MPH) | OR FASTEST MILE (MPH) 10 | DIRECTION 05 | TIME 1750

TIME CHECK:: 0037 // 0631 // 1228 // 1835 // NCDC//08 AT 2150 COL 13 SHOULD READ 10200 NOT 102//LAKE ERIE TEMP 69F/21C//BARO CHART CHANGED AT 1300//W. G. CHART CHANGED AT 2359:READ 20. SET TO 20//FASTEST ONE MINUTE WIND SPEED AND PEAK WIND SPEED WERE THE LAST OF SEVERAL OCCURRENCES//SP:00 RS:00

TABLE 8-2. (Con tin ued)

NF1-10A (1-85) — U.S. DEPARTMENT OF COMMERCE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / NATIONAL WEATHER SERVICE

SURFACE HE HER OBSEF ATIONS

STATION BUFFALO. NY

DATE JULY 1. 1991

TO CONVERT LST TO GMT ADD 05 hrs. SUBTRACT ___ hrs

TYPE (1)	TIME (LST) (2)	SKY AND CEILING (Hundreds of Feet) (3)	VIS (Mi) SFC (4)	VIS (Mi) TWR (4a)	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS (Mbs) (6)	TEMP (deg.F) (7)	DEW PT. (deg.F) (8)	WIND DIR (00-36) (9)	WIND SPEED (Kts.) (10)	WIND CHAR-ACTER (11)	ALTIMETER SETTING (Ins) (12)	REMARKS AND SUPPLEMENTAL CODED DATA (13)	OBSERVER'S INITIALS (15)
SA	1050	CLR	2s			154	57	51	00	##		999	205 75	
		72528 32982 00000 10139 20106	9898	0154	2005 333 10239	0139	79999	55	0106	PR06				
SA	1150	CLR	25			156	54	51	06	03		959		
SA	1250	BOSC1250SC1	25			152	54	49	14	04		99B	98396	
SA	1350	BOSE IE130BKN	30			152	53	49	14	04		99B	602 1070	
SA	1450	BOSCTE1308KN	30			159	53	49	14	05		000		
SA	1550	BOSCTE1208KN	30			162	56	49	13	03		D01		
SA	1650	90SCTE120BKN	30			166	58	51	17	05		D02	2141070 52 RADAT 3 0 1 4 1	PR
		72520 32983 71705 10144 20106	9910	0166	2014 87070 333	0244	20111	807/	55	0112	COR1	PR1;		
SA	1750	120SC1230SC1	30			168	65	53	07	07		003		
SA	1850	120SC1250-BKN	30			166	70	54	11	07		D03		
SA	1950	120SC1250-BKN	30			167	71	50	08	04		003	EW CU/1 0 2 1171	
SA	050	120SC1250-BKN	30			1b7	73	48	08	05		003	EW CU	
SA	150	120SC1250-BKN	30			166	75	46	03	09		003	EW CU	
SA	250	130SC1250-SCT	30			162	75	47	05	Ob		D01	EW CU/ 805 11715 2	
		72520 32683 40506 10239 20083	19507	0162	0005 81171 333	0250	20111	55	4021	0118	TK18			
SA	350	130SCT250-SCT	30			150	76	45	03	08		998		
SA	450	130SC1250SCT	30			148	78	45	33	07		997		
SA	550	130SC1250SCT	30			141	78	43	04	08		995	720 1071	
SA	650	E130BKN	30			141	75	44	03	08		995	HNC 35V07	
SA	750	110SCTE130BKN	30			136	73	42	05	09		994	HNO 01V09	
SA	850	85SCTE1108KN150BKN	30			138	71	41	05	07		994	ACCAS ALQOS VIRGA N AND	
		72520 31983 70507 10217 20050	5.83	0138	7003 71411 87080	33	10261	0111	55	0200	KP00			
SA	950	85SCTM1108KN150BKN	10			139	69	41	08	05		995	ACCAS ALQOS VIRGA N - N E H NOS E AB14E19	
SA	1050	M1108KN150BKN	30			138	68	41	08	Ob		995	FEW ACCAS	
SA	1150	110SCT	30			138	66	39	10	06		995	102 1070	
SA	125 1	100SCTE130BKN	30			138	65	39	10	CL		995		
SA	1150	95SCTE130BKN250BKN	30			131	65	40	12	07		993		

A synoptic observation, in WMO code format FM12-VII, is entered on line following related aviation observation
FM12-VII: IIiii iRiXHVV Nddff 1snTTT 2snTdTdTd 3PoPoPoPo 4PPPP 5appp 6RRRtR 7wwW1W2 8NhCLCmCh

*TABLE 8-3. UNIT CONVERSIONS FOR **METEOROLOGICAL** DATA*

Hours	Cloud Cover (fraction)	Relative Humidity (fraction)	Wind Speed (kts)	Wind Speed (m/sec)[a]	Temperature (degrees F)	Temperature (degrees C)[b]
1	0	0.8	0	0.000	57	13.89
2	0	0.9	3	5.828	54	12.22
3	3	0.83	4	7.770	54	12.22
4	6	0.86	4	7.770	53	11.67
5	8	0.86	5	9.713	53	11.67
6	8	0.78	3	5.828	56	13.33
7	9	0.78	5	9.713	58	14.44
8	4	0.65	7	13.598	65	18.33
9	7	0.57	7	13.598	70	21.11
10	8	0.48	4	7.770	71	21.67
11	9	0.41	5	9.713	73	22.78
12	8	0.36	9	17.483	75	23.89
13	5	0.37	6	11.655	75	23.89
14	3	0.33	8	15.540	76	24.44
15	3	0.31	7	13.598	78	25.56
16	4	0.29	8	15.540	78	25.56
17	8	0.33	8	15.540	75	23.89
18	7	0.33	9	17.483	73	22.78
19	9	0.34	7	13.598	71	21.67
20	9	0.36	5	9.713	69	20.56
21	8	0.38	6	11.655	68	20.00
22	3	0.37	6	11.655	66	18.89
23	7	0.39	6	11.655	65	18.33
24	9	0.4	7	13.598	65	18.33

[a] Meters/second = knots/.514791

[b] Degree C = (degrees F - 32) • 5/9

TABLE 8-4. PARTIAL COUNTY ESTIMATE-BY RESULTS MODIFICATION

Model Output for Model Run for Near County = 62,524.13 kg

Area of Near County = 215761.6 ha

Area of Near Co. within the Ozoneville non-attainment area:

Hopewell Township = 5243 ha
Gaines Community = 4789 ha
Lake City = 98613 ha
total = 108645 ha

non-attainment area is 50.35 % of Near Co.

50.35 % of 62524.13 kg = 31483.52 kg biogenic emissions

In the second method, the input files can be modified to model partial counties if sufficient spatial data are available. PCBEIS uses the file CNTY to define the area and land use types of each county. By altering the contents of the file, the program can be run using only the part of the county of interest. This method can also be used to correct the land use classifications that are listed in the file, without changing the area. The procedure is to:

- Make a copy of the original CNTY. ASC file on a floppy or some other safe place;
- Use a text editor to find and alter the listing for the county of interest. Counties are sorted by FIPS code. The format of the individual records is in Table 10 in the PCBEIS documentation. Do not alter the first line of the record. The spacing of each word has been formatted and that is how the computer finds the county.
- Check the accuracy of the land use types in the county. Set the value for the area of the partial county, and area (all areas are the hectares) of land use types. Make sure the land use types add up to the area of the partial county;
- Convert CNTY.ASC to CNTY.DAT by running the DOS command ASCCON.EXE;

- Run PCBEIS. The output will be the value for the partial county. This version's output and copies of CNTY.ASC and CNTY.DAT should be kept in a separate directory or disk that is clearly labeled; and

- Include in the print-out of the modified CNTY.ASC file in the inventory documentation, along with a justification of the data and methods used.

An example of how this method should be documented is shown in Table 8-5.

TABLE 8-5. REVISIONS TO LAND USE FILE FOR PARTIAL COUNTY ESTIMATES

Listing in cnty.asc for Near Co.
37183 NC Near Co
215761.6 18407 686 0 0 0 0 39835 65325 25490 219 2256 8916
4251 0 6076 1428 0 0 0 18 1305 620 5373 35556.57

Revised version of cnty.asc for non-attainment portion of Near Co.
37183 NC Near Co
108645 13603 423 0 0 0 0 15155 30290 17764 73 448 3297
1786 0 2940 397 0 0 0 0 0 0 0 2570 19899
Sources for land use: Near County Cooperative Extension Service
Near County Planning Department

Model Output for Revised Model Run for Near County = 28410.67 kg biogenic emissions

8.2 MODEL OUTPUT

Model results should be documented by the model output file, as shown in the example in Table 8-6. This file presents the model location and meteorologic input data, hourly modeled estimates for isoprene, alpha-pinene, monoterpenes, and unidentified hydrocarbons, and the total of all species for that day. The total in this file is the typical ozone daily biogenic emission estimate to be used in the base year inventory.

TABLE 8-6. EMISSION RATES CORRECTED FOR MET INPUTS

*****Near Co NC*****

Simulation Date: 8119188

Latitude: 35.80

Longitude: 78.60

Time Zone: 5

HR	CLD frac	RELH frac	Wind m/s	TmpsRF C	Isoprene kg/h	ISO Flux kg/km2-h	ALPHA-P kg/h	APH Flux kg/km2-h	APH Flux kg/h	MONOTERP kg/km2-h	MON Flux kg/h	Unknown kg/km2-h
1	0.3	0.56	3.1	26.7	0	0	146	0.134	154.67	0.142	310.67	0.286
2	0.5	0.58	0	26.1	0	0	130.16	0.12	135.97	0.125	272.55	0.251
3	0.6	0.63	0	25.6	0	0	126.26	0.116	131.48	0.121	263.34	0.242
4	1	0.61	3.6	26.1	0	0	141.11	0.13	148.99	0.137	299.22	0.275
5	1	0.61	3.6	26.7	0	0	146.44	0.135	155.21	0.143	311.86	0.287
6	0.8	0.66	3.1	25.6	3.35	0.003	132.57	0.122	139.06	0.128	280.85	0.258
7	0.8	0.63	4.1	25.6	54.26	0.05	143.16	0.132	151.43	0.139	302.74	0.279
8	0.5	0.66	3.6	25.6	120.11	0.111	163.2	0.15	175.17	0.161	344.08	0.317
9	0	0.56	4.6	28.3	260.52	0.24	207.24	0.191	228.09	0.211	445.23	0.41
10	0.1	0.47	4.1	30.6	450.26	0.414	246.8	0.227	276.66	0.255	538.88	0.496
11	0.1	0.42	4.1	32.8	609.9	0.561	285.74	0.263	325.2	0.299	633.72	0583
12	0.1	0.35	3.6	35	721.45	0.664	321.54	0.296	370.33	0.341	724.46	0.667
13	0.1	0.31	3.6	35.6	729.91	0.672	326.72	0.301	376.81	0.347	739.33	0.68
14	0.1	0.28	4.6	37.2	740.86	0.682	344.22	0.317	398.89	0.367	787.54	0.723
15	0.3	0.18	4.6	38.9	708.51	0.652	351.04	0.323	407.29	0.375	814.24	0.749

TABLE 8-6. (Continued).

*****Near Co NC*****

Simulation Date: 8/19/88

Latitude: 35.80

Longitude: 78.60

Time Zone: 5

HR	CLD frac	RELH frac	Wind m/s	TmpsRF C	Isoprene kg/h	ISO Flux kg/km2-h	ALPHA-P kg/h	APH Flux kg/km2-h	APH Flux kg/h	MONOTERP kg/km2-h	MON Flux kg/h	Unknown kg/km2-h
16	0.4	0.15	6.7	38.3	581.91	0.536	326.16	0.3	375.5	0.346	754.85	0.695
17	0.4	0.15	8.2	37.8	420.35	0.387	305.41	0.281	349.28	0.321	705.99	0.65
18	0.3	0.25	5.7	35.6	133.08	0.122	258.54	0.238	290.66	0.268	588.95	0.542
19	0.3	0.24	5.1	35	0	0	249.1	0.229	279.03	0.257	564.36	0.519
20	0.3	0.25	4.1	33.3	0	0	222.61	0.205	246.42	0.227	497.76	0.458
21	0.3	0.38	5.1	30.6	0	0	188.61	0.174	205.26	0.189	413.84	0.381
22	0.3	0.45	4.1	30	0	0	180.91	0.167	196.01	0.18	394.79	0.363
23	0.6	0.49	4.1	29.4	0	0	174.19	0.16	187.98	0.173	378.56	0.348
24	0.6	0.54	3.6	28.3	0	0	162.19	0.149	173.73	0.16	349.35	0.322
Total Species					5534.48	5.094	5279.93	4.86	5879.11	5.411	11717.15	10.785

Total of all species: 28410.67 kg

Total of all species: 31.32 US short tons

SECTION 9

QUALITY ASSURANCE IMPLEMENTATION

A comprehensive and accurate emissions inventory, particularly the point source component, is a basic building block of an air pollution control program. Accordingly, the emissions inventory should be maintained and updated on a routine and continuous basis. The point source component may be updated as frequently as on a daily basis. Therefore, quality assurance and quality control (QA/QC) activities related to the point source emissions inventory must also be performed on a routine continuous basis and not only when an emissions inventory is compiled for a particular effort, such as part of the supporting documentation for a revision to the State Implementation Plan (SIP).

Conventional QA/QC procedures govern the acquisition and analysis of measurements. These procedures commonly address the fundamental concepts of data accuracy, i.e., assessing the difference between measured and true values.

The QA implementation section of the emission inventory report should document all of the QA procedures performed by the State to ensure the completeness and reasonableness of the emission inventory. The information in the QA section should be detailed enough to allow comparison with the State IPP Quality Assurance Plan (QAP). The procedure used to implement the QAP and the actual results of the QA procedures should be fully documented.

Most of this section of the guidance document is written as an example of how to present and document QA implementation for the emissions inventory. However, beginning with Section 9.6, some instructional information is included within the example. The subsections are organized according to the QAP format required for the IPP. This organizational structure provides a clear coherence between the State's proposed QA procedures in the QAP and the actual implementation of those procedures.

9.1 INTRODUCTION

This section of the emission inventory report describes the quality assurance/quality control (QA/QC) procedures that were followed by the State Department of Environmental Regulation (DER) in developing and maintaining the Ozoneville Nonattainment Area emissions inventory. Qua&v assurance procedures, as applied to this emission inventory, involved checking the comprehensiveness and reasonableness of emission estimates, rather than the accuracy or precision of the data. Quality assumnce in general consisted of three types of procedures:

1. Standard operating procedures;
2. Procedures for finding and correcting errors and inconsistencies; and
3. Procedures for data quality assessment.

The Ozoneville Nonattainment Area QA/QC Plan included the following basic elements:

- QA/QC policy statement describing the purpose of the program;
- Summary of the organization of the emissions inventory and QA/QC programs, including assignment of emission inventory tasks and information flow;
- Description of the technical operating procedures, including resource allocation; personnel training and schedules; data collection, handling, analysis and validation procedures; and reporting formats;
- Description of audit responsibilities, schedules, and procedures; and
- Description of the methods used to document and quantify the implementation and effectiveness of the QA/QC Plan.

The QA/QC section of the Ozoneville Nonattainment Area emissions inventory, therefore, mirrors the organizational structure of QA/QC Plan submitted with the IPP. The purpose of repeating that organizational structure here is to show, without ambiguity, that the Ozoneville Nonattainment Area QA/QC Plan approved by the EPA Regional Office was implemented.

The remainder of this section is organized as follows: Section 9.2 presents the Quality Assumnce Policy Statement; Section 9.3 describes the DER staff responsibilities in developing the sessions inventory; Section 9.4 discusses task planning; Section 9.5 presents data collection and handling procedures; Section 9.6 presents data analysis procedures; and Section 9.7 discusses QA/QC system audits.

9.2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) POLICY STATEMENT

This section briefly describes the different ways in which an emissions inventory is used in developing and implementing air pollution control programs and presents the scope of the Ozoneville Nonattainment Area emissions inventory QA/QC effort. This policy statement represents Ozoneville's formal declaration of its commitment to develop and implement an emissions inventory QA/QC program.

Purpose of an Emissions Inventory

The purpose of an emissions inventory is to develop an accumte and comprehensive database of point, area, mobile, and, in certain instances, biogenic source emissions estimates. Emissions inventory information is relied upon to meet a variety of needs in the environmental arena. The principal ways in which it is used include:

- Supporting aspects of the air quality planning function, such as evaluating compliance with operating permits.
- Estimating air quality impacts through modeling. Related data, such as information on spatial and tempoml resolution, are also used in episodic modeling.
- Determining the trends in emission levels, both historically and prospectively.
- Tracking, on a consistent basis, the 3% annual emission reduction requirement for nonattainment pollutants.
- Assisting in the process of developing and evaluating air quality-related indicators for measuring progress in attaining ambient standards.

- *Determining the effect of transportation control measures on a region's emissions.*
- *Distinguishing between actual versus allowable emission estimates.*
- *Detennining emissions fees.*
- *Satisfying other regulatory needs such as evaluating the effects of emission controls and meeting emissions reporting requiremenh.*

The Owneville Nonattainment Area emissions inventory meets the inventory requirements of the Clean Air Act Amendments of 1990 (CAAA) for VOC, CO, and NO, emissions estimates. A separate effort is currently underway, in cooperation with surrounding States, to develop an air toxics emissions inventory.

Scope of the QA/QC Program

To ensure that the emissions inventory was of the highest quality, the DER implemented QA/QC procedures and checks at various points in the inventory process. Resources, including trained QA/QC personnel, were allocated for this purpose. DER followed the procedures outlined in the EPA's Guidance for the Preparation of Quality Assurance Plans for O,/CO SIP Emission Inventories (EPA-450/4-88-023) when developing emissions estimates for SIP-related activities. Details of the Ozoneville Nonattainment Area emissions inventory QA/QC program implementation are discussed in the following subsections.

The undersigned agree with the QA/QC Emissions Inventory policy statement described above.

John L. Green, P.E.
QA Coordinator

Sam K. Clean, M.E.M.
Manager
State Department of Environmental Regulation

9.3 STAFF RESPONSIBILITIES AND ADMINISTRATIVE PROCEDURES

A description of the DER staff responsibilities in developing the emissions inventory is presented in this section. Figure 9-1 depicts the DER emissions and QA/QC program organizational structure.

Dave Jones served as Project Manager for the Ozoneville Nonattainment Area emissions inventory. Mr. Jones' experience is especially well-suited for these projects. Prior to joining DER, he was the primary State Implementation Plan Coordinator for a local air pollution control agency, with special emphasis on motor vehicle-related pollutants. With DER, he has directed computer activities to develop, access, and process inventory data in a usable form. He also developed DER's approach for area and mobile source post-1987 inventories.

Technical direction for this project was provided by Melissa King. Ms. King has nearly 15 years of experience in developing and evaluating SIP-related inventories. The author of numerous inventory-related papers, Ms. King spent approximately 6 years with EPA in California and Washington in- SIP development activities, with special emphasis on point sources. Since coming to DER in 1981, Ms. King has managed many inventory projects, and has provided technical guidance and evaluation on others.

John Green served as the QA Coordinator for the emission inventory. Mr. Green has a degree in Environmental Management and spent seveml years consulting prior to joining DER. He has worked on toxics inventories for EPA and SIP inventories for New Jersey. His experience also includes QA consulting for General Pollution Company.

9.4 TASK PLANNING

The following planning components were implemented, as discussed in the QA/QC portion of the IPP, are discussed in this subsection:

- Resource allocation and delineation of responsibilities;
- Prioritizing sources and dam elements;

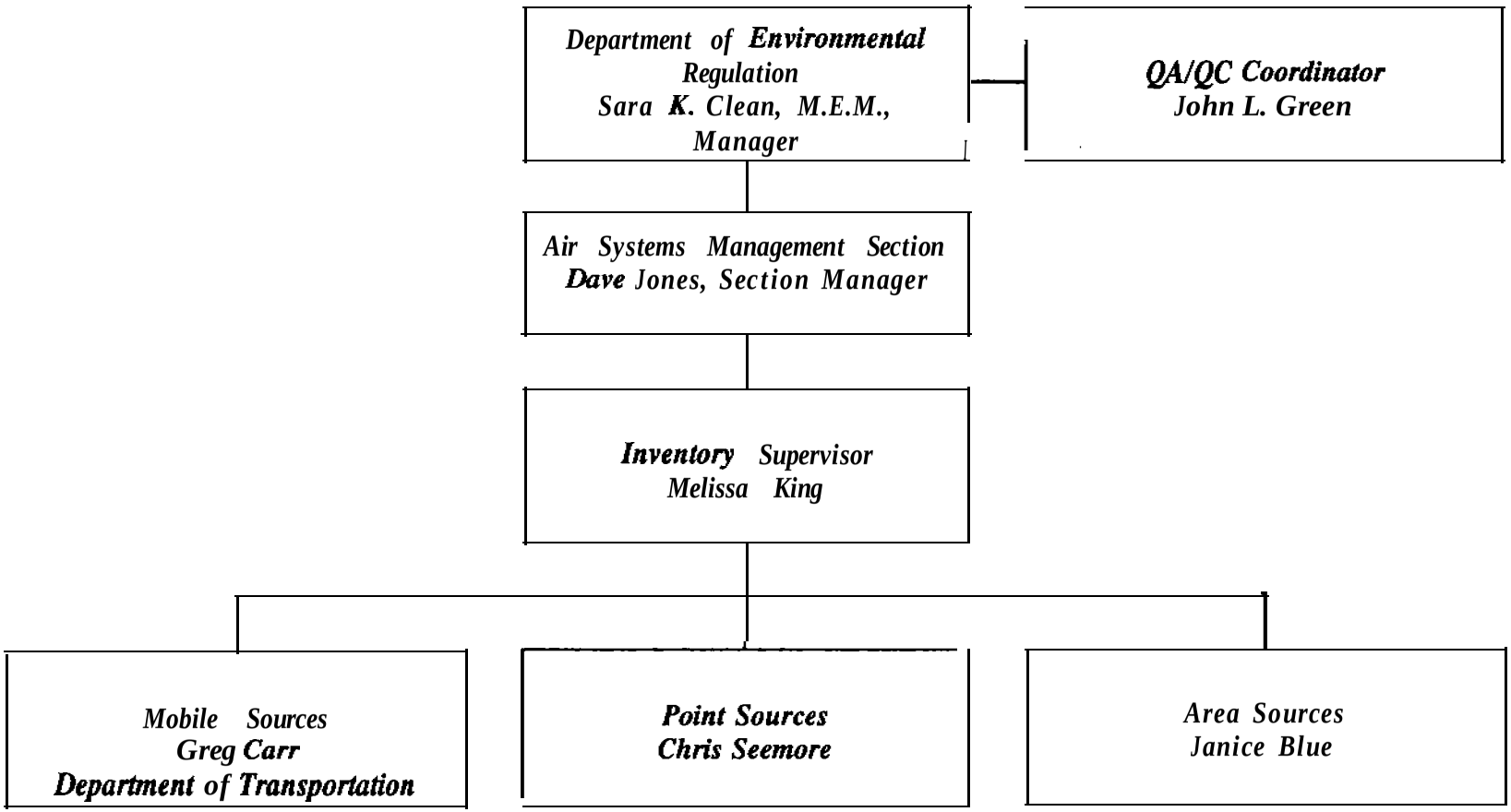

Figure 9-1. Organization Chart of Ozoneville DER Quality Assurance/Quality Control Staff.

- Personnel training;
- Schedule and project planning; and
- Data

Resource Allocation and Delineation of Responsibilities

In the Air Systems Management Section (ASMS) of Ozoneville's DER, a full-time engineer maintains and revises the emissions database (ED) and a contracted technician spends about 0.75 work-year on system maintenance. In addition, the head of the ASMS spends between 0.10 and 0.20 work-year on point source emission inventory. QA/QC-related management work. The focus is on addressing problems related to the progmmming features of the ED. Of the time spent on the ED, approximately 1.0 work-year could be characterized as QA/QC-related. Additionally, 0.50 work-year is applied to data entry and another 0.50 work-year is used for ED system maintenance.

The Permit (PMT) Section is responsible for issuing permits for new sources and updating permits for existing sources every 2 to 5 years. After issuing a permit, the responsible personnel are required to enter any revisions into the ED. Annually, PMT spends a minimum of 2.5 work-years of effort on developing and entering data into the ED. The PMT Section also spends an additional 0.10 work-year on point source emission inventory QA/QC activities and 0.25 work-year on ED maintenance. Additional resources will be devoted to QA/QC activities by the PMT staff in the future. However, frequent revisions to the ED are also entered by field inspectors from the Field Operations Section (FOS). Their yearly and quarterly inspections often provide more timely notification of changes in source process parameters. They spend approximately 2.25 work-years on developing ED revisions, 0.25 work-year on entering these revisions, 1.0 work-year on QA/QC activities, and the remaining 1.0 work-year on ED maintenance.

The Air Quality Planning Section (AQPS) is responsible for gathering information and providing QA/QC review for specific emission inventory projects, such as emission inventories

developed to support SIP-related activities. In addition to this centralized review, the emission estimates for SIP inventories are sent to State regional offices for local review. Corrections and revisions to the database are then implemented before the emissions are used for SIP purposes. Point source emissions inventory QA/QC activities involve about 2.0 work-years of the time of four staff members, 0.30 work-year of a computer specialist, and 0.40 work-year of a manager.

Prioritizing Sources and Data Elements

In order to focus emission inventory development and QA/QC efforts in the most effective way, DER prioritizes source categories and data elements so that the most important categories and elements receive the most attention. In general, facilities and source categories with large emissions receive priority over those with relatively smaller emissions. Facilities and source categories that were not included as point sources in the post-1987 emission inventory, however, receive priority over those that were included in previous inventory efforts.

Point source emissions are fairly well-characterized in the Ozoneville Nonattainment Area as a result of work done for the post-1987 inventory. However, DER is aware of some shortcomings in location and stack information for some point sources. Therefore, those data elements were given a high priority during data collection.

Data elements required for submit&l through AIRS were also investigated. These data elements were highlighted on the data collection survey forms as mandatory information requirements. The EPA Procedures Document (EPA-450/4-91-016) was reviewed to identify any point source categories not included in the post-1987 inventory. DER found several source categories not previously inventoried and prioritized data collection activities to ensure their inclusion in the 1990 emissions inventory.

The Ozoneville Nonattainment Area area source inventory was less well developed than the point source inventory. Area source categories previously accounted for were compared to the area source category listing in the EPA Procedures Document. The DER also examined

several national databases (TRIS, NAPAP), the Ozoneville Manufacturer's Directory, and local telephone directories to identify other area source categories. Newly identified categories almost doubled the size of the Ozoneville nonattainment area area source inventory. Data collection activities for the new area sources were given the highest priority.

The Ozoneville Nonattainment Area mobile source inventoty was administered by the Department of Transportation (DOT). Data collection activities at DOT are ongoing and do not coincide with any particular inventory development effort. Therefore, any inventory outstanding data needs for the 1990 base year inventory were given the highest priority by DOT. The primary efforts were focused on new EPA procedures as required by the CAAA.

Personnel Training

Formal training sessions for inventory personnel were provided by EPA training workshops, as available. Informal tmining sessions for DER inventory staff were held as further EPA guidance became available. Topics covered in these sessions included:

- Contents of existing and new EPA emissions inventory-related guidance or policies:
- New or updated data sources or procedures for determining emissions estimates;
- AIRS/SAMS/AFS/AMS tmining; and
- Ozoneville DER policy and standard operating procedures.

New personnel received extensive briefings from their respective supervisors. However, most of their training regarding the details of their dudes was on the job. Training materials (e.g., books, videotapes, and a portable computer that may be checked out for training purposes) were available to familiarize new personnel on inventory work.

Schedule and Project Planning

Planning the QA/QC procedures was one of the most critical aspects of the successful implementn of the progmm. In geneml, QA/QC procedures can be broken down into two groups:

- *Those procedures that are performed on a continuous or periodic basis to maintain the inventory; and*
- *Those procedures performed in response to a specific inventory preparation, such as a SIP.*

The evaluation of QA procedures culminates with internal and external audits of the procedures. Internal audits were performed on a periodic basis while external audits were performed by the EPA Regional office after inventory submittal. Both types of audits are important because they provide a focus for evaluating QA/QC procedures. The schedule for these procedures is shown in Table 9-1.

Data Sources

DER requires that permits be obtained for virtually all pollutant-emitting activities, regardless of the size of the source. Approximately 5,000 permit applications are received each year. Permits are renewed approximately every 2 to 5 years. Therefore, the permit program provides much of the information contained in the ED. In addition, the PMT Section inspects about 2,000 facilities each year and gathers inventory-related information as part of these compliance inspections. This information is used primarily to update the ED.

Some data sources are more reliable than others, and it is important that the reliability of the data be taken into account when entering data into the ED. For this reason, DER inventory specialists assess all data that come to them and judge the capabilities and biases (if any, and if known) of the organization supplying the data, the techniques used to collect the data (if known), and the purpose for which the data have been compiled. This enables DER to

TABLE 9-1. SCHEDULE FOR QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Frequency	QA/QC Procedure	
Continuous or as required	A technical specification form turned in with every permit application till be used to identify emission sources and emissions data.	5.1.1
	Inspections will be performed at facilities discovered to be emission sources based upon records review, visual identification, in response to citizen or agency complaints, or for compliance or special studies.	5.1.2
	DER will review U.S. EPA guidance, existing databases, and other sources of information to identify emission sources and emissions data (e.g., stack parameters, emission factors, SIC and SCC codes location parameters, control effectiveness, operating schedules, activity levels).	5.1.3
	Emissions data in the ED will be cross-checked against other published data for reasonableness.	5.1.3
	Control efficiencies for sources will be compared against listed U.S. EPA or applicable regulations to identify erroneous assignment of control effectiveness.	5.3.3
	DER will assess all emissions data received and will judge the professional capabilities and biases (if any, and if known) of the organization(s) supplying the data and the purpose of compilation. Comments for selection of one type of data over another will appear in inventory documentation.	5.3.4
	For each source category included in the inventory, the emission estimation method will be documented, as well as a hand calculation example showing all assumptions, unit conversions, or emission factors, used in calculating emissions.	6.2
	A computer file will be maintained to track all revisions to the ED database and all QA checks performed.	5.3, 6.3.3

TABLE 9-1. (Continued

Frequency	QA/QC Procedure	QA/QC Plan Section
Continuous or as required (continued)	All new and revised emissions data will be manually checked for completeness and accuracy before entry into the ED.	5.3
	The DER will perform QA/QC checks of all data entered for format consistency, segment consistency, accuracy, and completeness.	5.3
	The QA/QC Coordinator will ensure that completeness checks are being conducted by each section in the DER.	5.3
	The means of communication between the sections of DER will be reviewed for consistency and adequacy.	5.3
Weekly	At a minimum of each week, the database will undergo a series of recalculations and programs that update the existing information. In addition to recalculating the emissions, this program includes the following: • The first report provides a list of applicable key fields for missing conditions and relationships that exist in the ED; • The second report provides a list of the facilities that were deleted by batch submittal during the past week; • The third report provides a list of the facilities that moved to a new location by batch submittal during the past week; • The fourth report provides a list of the permits that were incorporated into another permit at the same facility by batch submittal during the past week; and • The fifth report provides a list of facilities that had their emission class changed during the past week.	5.3.1

jes/sip

TABLE 9-1. (Continued)

Frequency	QA/QC Procedure	QA/QC Plan Section
Weekly (continued)	A computer program will be run on the ED database in which SCC codes for each facility are compared to valid SCC codes in the ED code table. Any codes found in the ED, not in the table will be identified in the SCC exemption report.	5.3.3
	A representative sample of all data element revisions will be compared for accuracy to the five reports generated during the weekly recalculation of emissions.	5.3
Monthly	Emissions data in the ED will be downloaded into a commercial database program that checks for reasonableness of input data and results.	5.3.2
	The QA/QC Coordinator will randomly select a data segment in the facility database and review the information entered into the ED against applicable inspection data.	5.3
	The central filing system will be examined by the QA/QC Coordinator for completeness and effectiveness.	5.3
	Data tracking procedures developed and conducted by each section will be examined.	5.3
Bimonthly	The QA/QC Completeness Report program is executed to identify data completeness errors.	5.3.1
Quarterly	The QA/QC Coordinator will evaluate the communication linkage within the DER, identify deficiencies, and recommend more effective communications, when applicable.	5.3
Annual	The AIRS database will be accessed to obtain SCC codes associated with each facility type. This list of source types will be compared with existing facility records to identify missing sources.	5.1.3

TABLE 9-l. (Continued)

Frequency	cedure	
Annual (continued)	A survey form will be mailed with a questionnaire to all facilities to update existing data. The data will be checked for completeness and reliability and entered into the EIS.	5.2.2
	A survey form will be taken to facility inspections and updated by inspectors. Ninety percent of U.S. EPA Class Al facilities will be inspected per year. *Fifty* percent of U.S. EPA Class A2 facilities will be inspected per year. Undated data will be entered into the EIS.	5.2.2
	A comparison will be performed of the change in facility emissions from the previous year to the current year to check reasonableness of data.	5.3.2
	A subset of all source types will be evaluated every year to check emission estimation method codes for consistent application in the calculation of emissions by checking emission.	6.1.3
	Emission factors used in calculating sources emissions will be verified with an AIRS-based SCC look-up table and the corresponding emission factor for that SCC to identify errors in emission factor assignment.	6.1.3
	Emission factors for a selection of sources will be examined to ensure consistent application of emission factors.	6.1.3
	The pollutant types reported for each source category will be compared for completeness against an SCC code look-up table that contains a list of pollutants for each source category in AIRS.	6.3.1
	Emissions for each facility will be compared against those from the same facility from the previous year. increases over specific percentages for specific facility sizes will be flagged and investigated.	6.3.2
	Reported emissions will be compared against the allowable emissions for that source. If reported emissions exceed the allowable emissions, the error is flagged and corrected or an enforcement action will be initiated.	6.3.2

TABLE 9-1. (Continued)

[redacted]	QA/QC Procedure	QA/QC Plan Section
Annual (continued)	Checks will be performed to compare minor and major source classifications against reported emissions tonnage. If a minor source exceeds the major source threshold for any pollutant or if a major source reports less than the major source threshold for any pollutant, the facility will be flagged, investigated, and corrected as required.	6.3.2
	For sources where emissions and throughput data are available, emissions estimates will be divided by throughput or fuel consumption to produce back-calculated emission factors (EF) and these back-calculated EFs will be compared to listed EFs.	6.3.2
	CEM data will be used to check reported source emissions estimates and operating schedules for sources with in-stack monitors.	6.3.2
	Emission percentile reports will be generated and used to flag "outliers" for follow-up investigation.	6.3.2
	DER will review and document all data handling procedures.	5.3
	A sample of at least ten percent of input data will be examined for consistency with surveys and/or inspection data.	5.3
	The QA/QC Coordinator, or designated personnel within each section, will conduct an annual assessment of the central filing system once per year.	5.3
	IEPA will document the results of its QA/QC efforts in the documentation for its emissions inventory, which will address: raw data (including emission factors) and references, calculation methods and references, calculated emissions, and summarization of significant QA/QC actions and other comments for each point source category. The inventory documentation will, therefore, serve as an audit.	7.1
	IEPA will conduct an independent and complete review of the QA/QC procedures used to deveiop and maintain the ED. The effectiveness of these procedures and the adequacy of technical and personnel resources will be assessed and documented.	7.1

understand the limitations of the data and to choose the best data for use in developing emissions estimates.

9.5 DATA COLLECTION AND HANDLING PROCEDURES

Data collection activities for the Ozoneville Nonattainment Area emissions inventory consisted of three major elements:

- Preliminary identification of emission sources;
- Specific collection procedures used to collect and handle emissions data from these sources; and
- Performance of QA/QC tasks to ensure the completeness and reliability of the data collected, the processing of these emissions data, and the reasonableness of the resulting emissions estimates.

The following subsections present the methodology used to collect and process emissions data and develop the Ozoneville Nonattainment Area emissions inventory.

Identification of Emission Sources

The first activity in compiling the emission inventory was to identify all pertinent sources located within the Ozoneville nonttainment area that emit VOCs, CO, and NO_x. Identification of point sources was performed using information from:

- Permit applications;
- Facility inspections that check sources at a given facility against those contained in the ED;
- A survey of unregistered sources; and
- Other databases, such as TRIS, which were cross-checked to identify potential missing sources (e.g., those facilities that reported air emissions under SARA Title III, but are not included in the EIS).

Identification of area sources was performed by reviewing:

- *The post-1987 area source inventory;*
- *EPA guidance documents;*
- *National databases;*
- *The Ozoneville Manufacturing Directory; and*
- *Local Telephone Directories.*

. *Data Collection*

In the early 1970s, when air pollution control programs at the State level were accelerated because of the passage of the Clean Air Act in 1970, Ozoneville ran a comprehensive program of source registration. AU known industrial and commercial-institutional sources suspected of any air emissions were registered. Since then, many more sources have been added through the permit system and there is a continued efforts to identify other pollution sources. However, the major emphasis in control programs in the early 1970s was on sources emitting particulates and sulfur dioxide. Consequently, relatively small sources of VOC and other pollutants were not a priority. In order to deal with this potential deficiency, a survey of VOC sources was performed by DER. A copy of the questionnaire used for the survey is shown in Figure 9-2.

A total of 6.50 potential sources of VOC emissions were identified on the basis of the number of employees within each SIC category with potential VOC emissions. A second questionnaire was mailed to the identified sources. Out of these sources, 250 questionnaires were returned. Each of the returned questionnaires was reviewed by an experienced DER engineer to estimate VOC emissions. Facilities identified as area sources were forwarded to the appropriate personnel. From this review, 47 plants were identified as potential VOC emitters of 10 tons per year or more. DER forwarded a complete registration package to these sources to

VOLATILE ORGANIC COMPOUND QUESTIONNAIRE					
Company Name			Plant Address or Location		
Date 4-14-89	Person Completing Form w/Title George Milad, Manager, Chemical Engineering		Mailing Address as above		Phone No.
Do any of the following descriptions apply to an operation in your establishment? Indicate "yes" or "no" for each of the seven items below.			If so, please estimate annual volumes, using purchase records, sales of product, or plant operating records.		
		Yes/No			Annual Volumes
1	Painting, varnishing, or lacquering of articles in manufacture or repair?		1-a	How many gallons did you use last year?	
			1-b	What was the solvent percent?	
2	Printing: (i) Rotogravure? (ii) Letterpress? (iii) Lithographic		2-a	How many gallons of ink did you use last year?	
			2-b	What was the solvent percent?	
3	Solvent use, to thin paint, varnish, lacquer, or ink?		3	How many gallons of solvent did you use?	
4	Degreasing, use of solvents to clean parts, products, tools, or equipment?		4	How many gallons of solvent did you use?	
5	Petroleum solvents, used to clean fabrics or rugs?		5	How many gallons of solvent did you use?	
6	Solvent or gasoline storage in tanks?		6-a	What is the capacity of your largest tank, gallons?	
			6-b	What was the throughput last year in gallons?	
7	Any other operation that uses and releases solvents or hydrocarbons?		7	How many gallons of solvents or hydrocarbons used annually in any other operation?	

PLEASE HELP US TO LEARN MORE ABOUT YOUR STATE'S AIR QUALITY. RETURN THIS FORM WITH YOUR ANSWERS FILLED IN TO THE ADDRESS GIVEN BELOW:

Department of Air Pollution Control
Ozoneville Nonattainment Area
High Towers - Suite 2
22 Second Drive
Ozoneville, Any State 11223

Telephone: (123) 456-7891

*Figure 9-2. **Volatile Organic** Compound Questionnaire.*

obtain detailed source data, but only a limited number of sources returned the completed registration forms. The data obtained from these sources were entered into the existing emission inventory database.

As mentioned above, DER updates its emission inventory for major sources every year and for minor sources every other year. In the beginning of the update year, sources are provided with a printout of the data in the database. Sources are requested to update these dam to account for any changes since the last update. Updates normally occur in the annual operating rate. When this information is received, appropriate changes in the existing database are made and emissions are recalculated. Although registered sources completed this process in the early part of 1939, another survey of these sources was carried out with major emphasis on VOC emissions. Using a simple questionnaire, sources were asked to report summer and annual VOC emissions. Information on VOC emissions from the survey results were used to update the existing emission inventories to the maximum extent possible.

For the area source emissions inventory, DER used techniques consistent with EPA's Procedures Documents. DER found that for some source categories, activity level data and allocation factors were not available at the county or subcounty level. Where primary data were not available at the required level, a zonal approach was used to agglomemte similar areas into larger units that could be reallocated on the basis of information for which primary data exist. The procedures used in these cases are documented in the area sources section of the emission inventory report.

Most of the area source category emission estimates were produced with population, employment (by SIC), housing, and land use data. The Center for Public Service of the University of Ozoneville compiles and updates population and employment statistics. These statistics were used as the basis for county estimates.

The remaining significant data set was land use. When specific information from State agencies was not available, USGS 1:250,000 land use and land cover maps were used to make assignments to the nonattainment areas. Facility-specific information was needed for landfills,

hazardous waste treatment, storage, and disposal facilities (TSDFs) and publicly owned treatment works (POTWs).

Data for the mobile source inventories were resolved to county level. County-level estimates were allocated to grid cells of 5 km^2 each for use with the Urban Airshed Model. Data resolved to the municipal@ level included fleet specifications, growth factors, registmtion data, and MOBILE4.1 model runs. When primary information was not available for the area, allocation procedures were used and the information was documented in the project notebook by the QA Coordinator.

Data Handling

Data handling responsibilities were delegated to individual DER employees for point, area, and mobile sources (see Figure 9-l). Sepamte emission databases were maintained for each source. Data were entered into each database as they were received. Data collection forms were filed and their content and location documented in the QA Coordinator's Data Source Reference notebook. A separate notebook was maintained for each source category in the inventory. A source category notebook documented all data sources investigated and used for that source category. Emission estimation procedures and assumptions were also documented. Finally, as the data were entered into the emissions d&bases, a computer file index was maintained. The computer file name, contents, date of last update, and person responsible were logged on the index. Figure 9-3 shows the computer file index form used by DER.

9.6 DATA ANALYSIS

The data analysis QA/QC procedures implemented by the DER included:

- Input data QA;
- Emission estimation methodology consistency and reasonableness checks;

AGENCY AND DEPARTMENT:						
Filename	Description/ Content	Responsible Person	Inventory Pollutant	Date Updated	Reference/ Source	Disk or File Location

Figure 9-3. Sample Computer File Index Form.

- Emission calculations consistency and documentation; and
- Validation of emission estimates.

Each of the above procedures is discussed in the following subsections.

Invut Data Quality Assumnce

The DER has implemented several QA/QC measures to ensure that the data input to the ED are of the highest possible quality. Procedures have been implemented to evaluate the completeness, reasonableness, consistency, and correctness of emissions data. There are two purposes for these evaluations: first, to enable the analyst to make an informed choice between two sources of the same data, especially if the data differ significantly in some respect; and second, to allow the analyst and users of the inventory to make informed judgements about the validity of the emission estimates for a particular category.

First, the ED has QC checks that are inherent in the point source database design. These features promote accumcy and reduce the potential for typographical and reasonableness errors during data coding and handling. When a data entry error is made, ED communicates the problem to the system operator. The error must be resolved by the operator before any further data entry. The following are examples of ED database QA/QC measures.

Format Consistency--used to prevent entering data into the wrong field (e.g., entering a source identification number in the control equipment code field).

Deletion Pmtection-prevents deletion of data in fields that control other data field calculations.

Accumcy Checks--look-up tiles automatically invoked for data consistency (i.e., applicable State regulations per the Source Classification Codes (SCCs), percent

efficiency per control device code, UTM zones, latitude/longitude coordinates, or city, county, and State codes).

Completeness Checks--all fields in data record must be entered before continuing to next record or attempting to print.

Second, the DER developed a QA worksheet addressing reasonable and comprehensive data system checks on the point source facility level. The data elements in the worksheet are required for inventory submittal through SAMS or AFS. Reasonable data mnge checks were incorporated into the worksheet to identify missing and potentially incorrect data elements. The types of mnge checks developed included opemting schedule and throughput, equipment capacities, pollutant codes, stack and plume pammeters, fuel heat content, fuel consumption,. process rate, control equipment codes and efficiencies, and emission estimates.

An example of the worksheet described above is shown in Table 9-2. States should include completed worksheets in an appendix as documentation of QA implementation. The range checks should be verified by each State to ensure that they apply to the State's particular circumstances. Range checks that will need to be developed by the State are identified as "State" in the "Range Check" column Additional point source inventory checks an agency may wish to implement are listed in Table 9-3.

The QA worksheets are included as Appendix Y. The column labeled "Reasonableness Check " provides checks with the most probable mnges DER expected to encounter. The 'Missing Entries" and "Range Failures" columns were designed to keep a count of identified problems. The Director of Inventory Prepamtion used these counts as an indication of problems in survey design/clarity, data reasonableness, data entry efficiency, and internal calculation methodologies. -Facility records in the ED were randomly chosen for the data checks. Fifty facility records with missing or erroneous data were identified. The record and file number containing the incorrect data were noted in the appropriate column.

TABLE 9-2. EXAMPLE POINT SOURCE DATA QUALITY ASSURANCE REFERENCE AND SUMMARY SHEET

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Plant General	FIPS State Code	State					
	FIPS County Code	State					
	Year of Record	1990					
	Plant ID (AFS or NEDS)	State					
	Plant Name	State					
	Street Address	State					
	City Name	State					
	Zip Code	State					
	FIPS City Code	State					
	Plant Latitude	State					
	Plant Longitude	State					
	UTM Zone	State					
	UTM Easting	State					
	UTM Northing	State					
	Primary SIC Code						
	Inventory Type (Ozone or CO)	CO or 0,					

TABLE 9-2. (Continued)

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Point General	FIPS State Code	State					
	FIPS County Code	State					
	Plant ID (AFS or NEDS)	State					
	Point ID (AFS or NEDS)	State					
	Hours Per Day	< =24					
	Days Per Week	< =7					
	Hours Operated Per Year	hrs * days					
	% Throughput Dec. - Feb.	o- 100					
	% Throughput March - May	o- 100					
	% Throughput June - Aug.	0 - 100					
	% Throughput Sept. - Nov.	0 - 100					
	sum of throughput	ne 100					
	Boiler Capacity	< 80% or > 120% of hrly. max rate * fuel heat content					
	% Space Heat	> 30% if true, then is winter % > summer %					

TABLE 9-2. (Continued)

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Point Pollutant	FIPS State Code	State					
	FIPS County Code	State					
	Plant ID (AFS or NEDS)	State					
	Point ID (AFS or NEDS)	State					
	Pollutant Code or CAS Code	State	any nonreactives				
	SIP Regulation						
Stack	FIPS State Code	State					
	FIPS County Code	State					
	Plant ID (AFS or NEDS)	State					
	Stack ID from AFS	State					
	Stack Height -(feet)	> 100, then review blank for given plume height					
	Stack Diameter (feet)	.5 > 30					
	Plume Height (vent height, ft)	> 200, then review blank for given stack height					

TABLE 9-2. (Continued)

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Stack (Continued)	Temperature of Exit Gases (°F)	60 > 2000					
	Temperature Exit Gases w/scrubber (°F)	> 250, then review					
	Temperature Exit Gases w/o scrubber (°F)	< 250, then review					
	Exhaust Gas Flow Rate (ACFM) (boilers)	capacity * temp					
	Exhaust Gas Velocity (ft/sec)						
Segment General	FIPS State Code	State					
	FIPS County Code	State					
	Plant ID (AFS or NEDS)	State					
	Point ID (AFS or NEDS)	State					
	Segment ID from AFS	State					
	SCC Number	State					
	Heat Content						
	Anthracite Coal	20 - 30					
	Bituminous Coal	20 - 30					

TABLE 9-2. (Continued)

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Segment General (Continued)	Lignite	10 - 20					
	Residual Oil	103 - 155					
	Distillate Oil	120 - 155					
	Natural Gas	800 - 1100					
	Process Gas	400 - 1100					
	Process Rate Units hourly	< 10% or > 125% * max design capacity					
	Actual Annual Process Rate						
	Assume: 8000 Btu/hp * hr						
	Assume: 1676250 hp						
	Coal (lb/hr)						
	solid @ 7500 Btu/lb	0 - 5364000					
	liquid @ 100000 Btu/gal	0 - 402300					

jes/sip

TABLE 9-2. (Continued)

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Segment General (Continued)	Natural Gas (lb/hr)						
	@150 Btu/lb	0 - 8.94 x 10^7					
	@550 Btu/gal	0 - 2.68 x 10^8					
	Annual Fuel Consumption (compare to previous year)						
	< 10 tons	% change ± 200					
	10 - 50 tons	% change ± 100					
	50 - 100 tons	% change ± 50					
	> 100 tons	% change ± 10					
	Maximum Design Rate						
	O_3 Season Process Rate (daily)						
	CO Season Process Rate (daily)	0 - 2.68 x 10^8					
	Stack ID Related to Segment	State					
Segment Pollutant	FIPS State Code	State					
	FIPS County Code	State					

TABLE 9-2. (Continued)

Data Level	Data Element	Rasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Segment Pollutant (Continued)	Plant ID (AFS or NEDS)	Sta:					
	Point ID (AFS or NEDS)	Sta:					
	Segment ID from AFS	Sta:					
	Pollutant Code or CAS Code	Sta:					
	Primary Control Device Code	Sta:					
	Secondary Control Device Code	Sta:					
	Control Efficiency	0 - 00					
	SIP Regulation in Place	Sta:					
	Compliance Year	Sta:					
	Emission Limitation Description	Sta:					
	Emission Limitation Value PH	0 -124000					
	PD	0 - 976000					
	PM	0 - 9280000					

TABLE 9-2. (Continued)

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Segement Pollutant (Continued)	PY	0 - 1.071 x 10^9					
	TH	0 - 62					
	TD	0 - 1488					
	TM	0 - 44640					
	TY	0 - 535680 > 800000					
	Emission Limitation Units	Pound/hour (PH)					
		Pound/day (PD)					
		Pound/month (PM)					
		Pound/year (PY)					
		Ton/hour (TH)					
		Ton/day (TD)					
		Ton/month (TM)					
		Ton/year (TY)					

TABLE 9-2. (Continued)

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Segment Pollutant (Continued)	Emission Estimation Method	*State*					
	Emission Factor g/hr	**0 - 6 x 10^8** compare to AIRS SCC assigned **EFs**					
	Season Adjustment Factor	1.25					
	Annual Nonbanked Emission PH	**>124000**					
	PD	**>2976000**					
	PM	**>89280000**					
	PY	**> 1.071 x 10^9**					
	TH	**>62**					
	TD	**>1488**					
	TM	**>44640**					
	TY	**>535680**					

*TABLE 9-2. **(Continued)***

Data Level	Data Element	Reasonableness Check	Missing Entries	Range Failures	Record Number	Reviewer's Initials	Date
Segment Pollutant (Continued)	(compare to previous year)						
	< 10 tons	% change ± 200					
	10 - 50 tons	% change ± 100					
	50 - 100 tons	% change ± 50					
	> 100 tons	% change ± 10					
	Rule Effectiveness (%)	0.8					
	O_3 Season Emissions (lb/day)						
	CO Season Emissions (lb/day)	o-720000					

TABLE 9-3. ADDITIONAL POINT SOURCE INVENTORY COMPLETENESS CHECKS

Segment	
Facility	Incomplete/invalid UTMs
	Missing UTMs
	Total facilities Significant facilities
	Invalid SIC codes
	Missing SIC codes Total facilities Significant facilities
	Missing ownership code
	Incomplete fugitive information
	Incomplete facilitv address
	Misspelled facility city names
	Possible incorrect facility ZIP codes
	Incomplete company address
	Misspelled company city names
	Possible incorrect facilitv ZIP codes
	Facilities without addresses
	Facility addresses to update
	Company addresses to update
	Possible duplicate ID numbers
Permit	Permit without contact
	Permit without received date
	Permit with invalid received date
	Permit with invalid status date
	Permit with invalid exniration date
	Permit without analyst

TABLE 9-3. (Continued)

Segment	
Permit (Continued)	Permit without confidential code
	Granted permit without expiration date
	Expiration date without granted permit
	Missing/incomplete status/status date/expiration date
	Granted permits without a source or control coded
	Number of expired permits Total Significant facilities
	Number of denied and rejected permits Denied Rejected
Source	Missing source name
	Source without permit number
	Source without mode segment
	Invalid process type code
	Incorrect process type code
Mode	Invalid SCC number
	Missing SCC number
	Incorrect SCC number
	SCC number without fuel code
	Incomplete fuel fields
	Invalid heat contents per fuel type
	Improper throughputs
	Modes with zero hours of operation
	Total average hours > maximum hours

TABLE 9-3. *(Continued)*

Segment	
Mode (Continued	SCC number without process weight rate (PWR) Total Total except tanks Tanks only Possible extra from blank SCC number
	Average PWR > maximum PWR
	SCC number without operating rate Total Extra from blank SCC number
	Average operating rate > maximum operating rate
	Modes without emissions
	Mode not feeding a control or stack
Emissions	Invalid rule
	Rule not matching pollutant
	Actual emissions > allowable emissions Particulate Sulfur dioxide Nitrogen oxides Volatile organic compounds (VOC) Carbon monoxide Lead
	PM,, emissions > particulate emissions
Control	Missing control name
	Control without permit
	Control without a control code
	Control name that doesn't agree with control code
	Control without efficiency
	Control not fed by a mode or control
	Control not feeding a control or stack

TABLE 9-3. (Continued)

Segment	
Stack	Incomplete UTMs
	Invalid UTMs
	Missing UTMs Total stacks Stacks at significant facilities
	Incomplete stack information
	Average temperature > maximum temperature
	Average flow rate > maximum flow rate
	Average plume height > maximum plume height
	Maximum temperature no average temperature
	Maximum flow rate no average flow rate
	Maximum plume height no average plume height
	Stack not fed by a source or control
Statistics	Dummy ID numbers
	Facilities with UTMs
	Facilities with SIC
	Significant facilities
	SCC beginning with 1 or 2
	SCC beginning with 3, 4, or 5
	Emission segments with rule
	Emission segments without rule
	Number of stacks
	Number of plumes
	Stacks at significant facilities
	Facility UTM but not stack UTM

TABLE 9-3. (Continued)

Segment	
Statistics (Continued)	Stacks with UTMs Of construction permits Of operating permits

Finally, DER developed a second worksheet where the facility record data errors and corrections were documented. The facility record and file number were used as a cross-reference to the range check worksheet.

The error documentation and resolution worksheet should be developed for each facility record containing 'erroneous data. The worksheet, along with copies of the erroneous facility record and corrected facility record, should be submitted in the emission inventory report as an appendix as proof of QA implementation. Table 9-4 provides an example of such a worksheet.

The error documentation worksheet, contained in Appendix Z, has three basic sections: facility identification information, error identification information, and an explanation/resolution of errors detected. The bottom of each worksheet was signed by the person who identified the error and the person who corrected the error. The source of the identified error and an explanation of how it occurred is thoroughly explained in the third section of the worksheet. Both the Director of Inventory Prepamtion and the persons responsible for data collection and entry were advised of the types of errors found and their causes. The proper procedural modifications were made to avoid redundancy of prevalent errors. The major types of errors encountered were missing data elements, erroneous information from the data source, incorrectly entered data, and incorrectly defined or applied calculation equations. The resolution of the data error was also described in this subsection.

The QA procedures implemented for the area source inventory are discussed in the Emissions Calculation Consistency and Documentation section. Mobile sources QA procedures are presented in Appendix C of the emission inventory report.

Emissions Estimation Methodology Consistency and Reasonableness Checks

Several emission estimating techniques may be used to calculate emissions from point sources. When more than one method was available for calculating a source's emissions, site-specific information, such as stack testing or continuous in-stack monitors, was given first priority. If stack test or continuous emissions monitoring data were not available, process

TABLE 9-4. EXAMPLE POINT SOURCE DATA QUALITY ASSURANCE DOCUMENTATION FORM

FACILITY IDENTIFICATION INFORMATION

Record Number: _____
Facility ID: _____
SCC code: _____
SCC Description: _____

ERROR IDENTIFICATION INFORMATION

Type of Error (check error type):

suggested range error _____
reasonableness error _____
missing entry error _____

Data Elements Corrected: (provide printouts/photocopy of wrong & corrected record)

Data Element	Wrong Value	Corrected Value

EXPLANATION AND SOURCE OF ERROR

Reviewer's Signature : _____
Review Date(s) : _____
Corrector's Signature: _____
Date Corrected : _____

information for the source, such as annual coating quantities used in material balance calculations, was given priority. If site-specific emissions data were not available, emission factors were utilized in conjunction with site-specific throughput data to estimate emissions.

Documentation of the specific estimation method used in computing a source's emissions is a significant aspect of the QA/QC program. Such documentation is necessary regardless of who (i.e., source or agency personnel) performs the emission calculations.

In order to ensure the development of a complete point source emissions inventory, an emission estimation method code was assigned to each emission source. When emission factors were chosen as the designated es&nation tool for a particular source category, all sources within that category used the same emission factor. If this was not the case, an explanation is provided clearly justifying the use of an alternative emission factor. A code was assigned to each emission factor documenting the source of the emission factor (date and title of document).

The emission factors should be documented along with the other emission estimation methodologies on a form like the one described earlier.

The emission estimation method codes utilized in the point source inventory include:

Measurement-Derived Methods:

- *Emissions based on source testing (primarily, stack testing);*
- *Emissions based on the use of continuous in-stack monitors;*
- *Emissions based on fuel analysis; and*
- *Emissions based on fence-line monitoring and air quality modeling.*

Estimation/Calculation Methods:

- *Emissions based on material balance;*
- *Emissions based on material safety data sheets;*

- *Emissions calculated using standard emission factors;*
- *Emissions based on engineering calculations; and*
- *Other (descripdon of methodology was specified).*

DER developed a list of preferred emission estimation techniques for each source category, by **SCC code.**

The State should develop a point source emission methodology documentation form. The purpose of this form is to document which emission calculation methods were used for the point source inventory. Each of the methods used should be listed and each of the source categories using the method should be identified. Also, the percentage of the source category covered under that approach should be determined. For example, emissions for half of the facilities identified in a source category may have been obtained from source testing data, while emissions for the other half may have been determined according to materials balances. The State should attempt to ensure that the most preferred method was employed for each source category and explanations should be provided if the preferred method was not used, or if several different methodologies were used with one source category.

The above form should be submitted with the inventory report as documentation of estimation methodologies used for each point source category and proof of quality assurance.

Emission estimation methods were reviewed as a part of the QA process. When the emission estimation method code indicated that an emission factor was used in calculating emissions for a particular source, the emission factor field was checked to determine if an emission factor was inputted. If the field was blank, the emission factor was hand-calculated by dividing the source's emissions by the corresponding activity level (e.g., fuel consumed, material throughput) to determine the emission factor used. This hand-calculated emission factor was compared to the AP-42 emission factor for that source. Discrepancies were investigated to determine if the hand-calculated **emission** *factor was justified. If inadequate*

documentation was provided, the sources's emissions were recalculated using the AP-42 emission factor.

Emission factors were also checked for reasonableness. An emission factor used in calculating a source's emissions was verified with a look-up table that contains the SCCs and the corresponding emission factors for each SCC. A computer program was used to perform this emission factor comparison. Emission factors that did not correspond with those contained in the look-up table were output in an exceptions report for further investigation and possible correction.

The State should include any such comparisons and QA procedures in an appendix in the emission inventory report as proof of QA implementation and to facilitate the review of the emission estimation procedures.

Emissions Calculation Consistency and Documentation

Documentation of methods used in calculating facility emissions estimates is a significant aspect of a QA/QC program, particularly when these calculations are performed by many different parties (e.g., various DER staff, industry). For each source category included in the point source emissions inventory, the emission estimation method used was documented (as illustrated in the previous section). A hand-calculated example showing all assumptions, unit conversions, and emissions factors used in calculating the emissions estimates for the subject source was also performed and is discussed here.

The important point in this QA/QC step is to document calculation methods for all significant source types. Sample calculations illustrating the two general types of equations that were used to compute point source emissions estimates are illustrated in the following examples.

The generalized equation to calculate VOC emissions estimates using a material balance was:

$$\text{Emissions estimate} = \frac{(U - M) * SD}{D * W}$$

where:

U = material used (gallons solvent/year);

M = material accounted for (gallons solvent/year);

SD = solvent density (pounds/gallon);

D = daily activity rate (days/week); and

W = weekly activity rate (weeks/year).

The general equation used to calculate daily emissions estimates was:

$$\text{Emissions estimate} = \frac{EF * Q * SAF}{D * W}$$

where:

EF = emission factor (pounds/ton of solvent used, pounds/l 000 gallons fuel, or pounds/ton material;

Q = activity rate (tons solvent/year, 1000 gallons fuel/year, or tons material/year);

SAF = seasonal adjustment factor (dimensionless);

D = dairy activity mte (days/week); and

w = weekly activity rate (weeks/year).

When rule effectiveness (RE) was applied to a regulated point source with controls, the general procedures and equations used were as shown.

The first step was to calculate the RE control efficiency (CEFF), using the following formula.

$$CEFF = (\text{Control efficiency}) \times (\text{RE factor})$$

The second step was to then calculate the daily emissions estimates by the following formula:

$$\text{Emissions estimate} = \frac{Q * EF * CEFF * SAF}{D * W}$$

where:

Q	=	activity rate (tons solvent/year, 1000 gallons fuel/year, or tons material/year);
EF	=	uncontrolled emission factor (pounds/ton of solvent used, pounds/l 000 gallons fuel, or pounds/ton material);
CEFF	=	RE control efficiency;
SAF	=	seasonal adjustment factor (dimensionless);
D	=	daily activity mte (days/week); and
w	=	weekly activity mte (weeks/year).

When seasonal adjustment factors (SAF) were applied, the following series of equations were used:

$$SAF = \frac{(\text{Peak season activity}) * 12 \text{ months}}{(\text{Annual activity}) * (\text{Peak season months})}$$

Seasonally adjusted emissions estimates were then calculated using the following generalized formula:

$$\text{Emissions estimate} = \frac{Q * EF * SAF}{D * W}$$

where: Q, EF, D, W, and SAF are defined above.

The State should include calculation and QA check sheets in an appendix to the emission inventory report as proof that a representative sample of point source emission estimates was checked. The calculation sheet should show the equations used, the actual calculations, and document all assumptions and data sources. Tables 9-5 and 9-6 show examples of potential calculation and QA sheets, respectively. An agency may choose to use a more detailed form, as best suits the State's particular circumstances.

The QA procedures implemented by DER for the area source inventory includes documentation of each area source category using a worksheet. The worksheet was developed for documenting area source category definitions, emission estimation methodologies, assumptions, and data sources. The Quality Assurance Coordinator reviewed each worksheet and signed it after any discrepancies were corrected.

States should include the area source category documentation and QA worksheets in an appendix to the emission inventory report. A worksheet should be developed for every area source category in the inventory. Any errors identified should be resolved and documented using the worksheet. Table 9-7 shows an example area source category QA worksheet. The purpose of this worksheet is to provide documentation of area source category definitions and emission estimation methodologies. Each area source category in the inventory should be documented using an individual worksheet. Agencies may choose to use a different format, as best suits the State's particular circumstances.

Validation Procedures for Emission Estimates

One of the final QA/QC checks performed in the emission inventory was the evaluation of the completeness, reasonableness, and accuracy of the emission estimates. Examples of these types of checks include evaluating whether all pollutant types expected to be emitted by a source in a given source category are included, and that the emission estimates are within the expected range established for that source category.

*TABLE 9-5. **EXAMPLE** POINT SOURCE CALCULATION SHEET*

Explanation and Description of Operation:

Sample Calculation:

Data Source:

Data for Method:

Job Number _____

Performed by: _____ Date: _____

TABLE 9-6. EXAMPLE POINT SOURCE QUALITY ASSURANCE SHEET

OA SHEET

Job Number: _____

Operation:

Performed by: _____ Date: _____

- For computer based calculations, a manual check of the protocol is required and at least one manual calculation using the protocol must be made.

  The check of the protocol shall include ensuring that the computer calculation accurately reflects the operation(s) from the **Calc** Sheet for the calculation.

- For manual calculations, 5% of the calculations are required to be recalculated and confirmed.

TABLE 9-7. EXAMPLE AREA SOURCE CATEGORY DOCUMENTATION AND QUALITY ASSURANCE WORKSHEET

AREA SOURCE CATEGORY DEFINITIONS AND CALCULATIONS
QUALITY ASSURANCE WORKSHEET

Area Source Category Definition:

SCC Code(s):

Emission Estimation Methodology (text description):

Was the same emission factor used for all source in Category?
Describe alternative methodologies and data sources considered.
Were all source3 in the category treated the same?

Reference Source for Activity Data:

Activity Data Calculation and Assumptions:

Quality Assurance Procedures Implemented to Verify Reasonableness of Activity Data Used:

Data Reference Source for Emission Factor Data:

Emission Factor Data Calculation and Assumptions:

Quality Assurance Procedures Implemented to Verify Reasonableness of Emission Factor Used:

Equation Used for Calculation Emissions:

Quality Assurance Cheek of Calculated Emissions:
(every area source category calculation should be verified)

Seasonal Adjustment Factors Applied:

Scaling-up Procedures Used:

Was Rule Effectiveness and Rule Penetration Applicable:

How Were Point Source Emissions Excluded:

How Were Nonreactive VOCs Excluded:

Reviewer's Signature:

Date Reviewed:

File Identification Number:

The primary completeness check performed on the Ozoneville nonattainment area emission estimates was the evaluation of whether all the expected pollutant types for each source category were reported. The pollutant types reported for a source category were compared against a look-up tile that contains acceptable SCC codes and "yes or no" for each pollutant. The look-up table was based on the reported pollutant types for each source category in the AIRS and EPA guidance materials. A report showing the differences between reported pollutant types and those expected for a source category was genemted and reviewed by the inventory supervisor.

Reasonableness checks were also performed to evaluate the accumcy of the calculated emissions estimates. Reasonableness checks discussed in this subsection include evaluation methods to determine whether the calculated emissions were within the expected mnge for a given source category.

For VOC sources, the percent of the total point source VOC emissions estimates attributable to small sources (< 25 tons/yr) was calculated. The percentage-should have been at least 5 percent, based on national figures. The contribution of small VOC sources to total VOC emissions estimates was greater than 5 percent. Therefore, a review of the small VOC sources included in the point source emissions inventory was not necessary to identify potential or missing VOC sources. Emissions of any pollutant greater than 0.025 lb/hr (OS tons/yr) were verified and included in the ED as a non-zero value.

For the synthetic organic chemicals manufacturing industry (SOCMI) source category, sources were checked to determine if VOC emissions from fugitive leaks were quantified. Fugiive leak emissions estimates were computed and added to the inventory for seveml facilities. Fugitive leak VOC emissions estimates should have been 1 to 10 times larger than emissions from vents, reactors, etc. Fugitive leak VOC emissions estimates outside this range were checked for accuracy and updated as required.

Several other reasonableness checks were also utilized in the Ozoneville nonattainment area point source emissions inventory. Reasonableness checks were initially made to evaluate

the accuracy of the source's actual emissions. Actual emissions were compared with the allowable emissions for that source. If actual emissions exceeded the allowable emissions, the error was flagged and the calculations were checked for errors in coding. If no coding errors were found, then the PMT Section was notified, unless the source was already noted as being out-of-compliance.

A second reasonableness check compared the source's current year's actual emissions with the previous year's emissions. For example, emissions for any pollutant in the current year was flagged if the difference from the previous year exceeded the following conditions:

Source Emissions by Pollutant (tons/yr)	Percent Change in Emissions by Pollutant
⟨10	±200
10 - 50	±100
50 - 100	±50
⟩100	±10

Any facilities flagged were investigated individually to identify causes for the changes.

For sources where emissions and activity data were available, emissions estimates were divided by throughput or fuel consumption to produce back-calculated emission factors. For sources using an emission factor in the calculations, this back-calculated value should have been equal to the emission factor. When the calculated value was lower than for other sources of the same type, a potential underestimation of emissions was indicated and appropriate corrections made as needed. In cases where an emission factor was not used, such as for storage tank emissions, the emissions/activity level varied. However, outlying values were identified using frequency distribution plots and investigated for consistency in calculation methods.

For sources that used continuous in-stack monitors, emission estimates were developed using these continuous emission monitoring (CEM) data (adjusted for missing time periods) and compared against estimates obtained using other techniques. Any significant discrepancies

were investigated. CEM data were also used to check seasonal and daily source operating schedules and emissions contained in the ED.

Area source category emission estimates were validated by comparing the relative magnitude of estimated emissions with other published inventories. The area source categories were ranked according to emissions magnitude, where the Largest category was assigned a mnk equal to 1, If any of the source category mnks were unreasonably different than their corresponding ranks in the other published inventories, then the category emission factor and activity data were reviewed for errors.

The State should identify the specific inventories used for comparison with its area source inventory (i.e., AIRS, TRIS, other State inventories). Additionally, any other validation procedures implemented should be documented and submitted as an appendix in the inventory documentation.

9.7 QUALITY ASSURANCE/QUALITY CONTROL AUDITS

The final step in the QA/QC process is to perform an internal audit of the inventory. The internal audit is an opportunity to examine the effectiveness of the existing inventory preparation procedures, ensure that the procedures are being followed, and make changes to improve the process.

In ternal Audits

Internal audits were conducted by the DER to verify the completeness and reliability of the emissions inventory data and procedures. Exhaustive quality review checklists have been developed by EPA that address two levels of review that should be performed during an audit (Quality Review Guidelines for 1990 Base Year Emission Inventories, EPA-450/4-91-022). The Ozoneville DER performed inventory audits using these checklists prior to submittal of the emissions inventory.

The State should include the completed copies of the Level 1 and Level 2 checklists as an appendix to the emission inventory report. The State may also wish to summarize any corrective actions taken as a result of the audit.

External Audits

External audits are performed by EPA to review the reasonableness of the emission estimates and of the QA/QC procedures. There are two stages in the inventory development process during which external audits may take place. The first is during the inventory preparation period, at which time the EPA Regional Office can review the procedures being used by a State. The auditors may review the IPP, which includes the QA/QC plan, with a view towards checking the inventory preparation activities against the proposed IPP and the QA/QC Plan.

The second is after submittal of the emissions inventory to the EPA Regional Office. The purpose of such an audit is to ensure that all feasible required inventory requirements were addressed in the inventory submittal and that the information structure exists to support the data contained in the inventory.

External audit visits may include interviews with persons responsible for collecting the inventory data, assimilating the source and emissions information, calculating the emissions, and preparing the inventory reports and reviews of State files and records. The purpose of the interviews are to establish that the agency is following or has followed the procedures outlined in the QA/QC plan in preparing the inventory, The audit may include procedures to address:

- Comparison of the emissions inventory components to the specified requirements;
- Completeness of the inventory in terms of the source categories addressed;
- General quality of the inventory as determined by comparison to the QA/QC checklist;

- Necessary disaggregation of the inventory summary by source category to allow for evaluation of the emission estimations; and

- Adequacy of supporting documentation including calculations or other emissions determinations.

The State should document all external audit correspondence and measures taken to revise the final inventory. This documentation should be submitted with the final inventory.

APPENDIX A

SAMPLE AIRS FACILITY SUBSYSTEM (AFS) REPORTS

This appendix contains three sarnple report printouts from the AFS database of AIRS. Appendix A-l represents an example of AFS Report AFP644 - AFS Plant Emissions Inventory. Appendix A-2 illustrates AFS Report AFP649 - AFS County Point Source Summary. AFS Report AFP634 - Emission Ranking for a Pollutant: VOC is contained in Appendix A-3. The example tables were extracted from the publically available portions of the AIRS database as of the date of this report. The data do not necessarily represent 1990 base year emissions for these sources and areas.

Appendix A-1. AFS Report AFP644 - AFS Plant Emissions Inventory

DATE: 03/26/92 AFS PLANT EMISSIONS INVENTORY PGM: AFP644
PAGE: 1

PLANT: 4099 - VALKYRIE SHIPBUILDERS INC CURRENT 1987
STATE: SD/46 CITY: 66700 - VERMILLION
COUNTY: 137 - ZIEBACH CO MSA: -

YEAR OF EMISSIONS : 1987
SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

PLANT NAME: VALKYRIE SHIPBUILDERS INC CURRENT 1987
ADDRESS : 2162 ROUTE 1
CITY,STATE: VERMILLION,SD 12345-6789
AQCR : 206

LAST PLANT UPDATE : 92/03/12
REGIONAL PLANNING : 09
LOCAL CONTROL REGN: 09

INSPECTOR : A01 - REX CALLOWAY
AMBIENT MONITORING: Y SOURCE MONITORING: Y

STANDARD INDUSTRIAL CLASSIFICATIONS:
1041 - GOLD ORES
5039 - CONSTRUCTION MATERIALS, NEC
5012 - AUTOS & OTHER MOTOR VEHICLES

MAILING ADDRESS:
NAME : VALKYRIE FIBERGLASS HULLS
ADDRESS : P.O. BOX 82164
CITY,STATE: YIGO,GU 12345-6789

NEDS : 4099 EPA ID NUMBER : EPA-ID-71589 DUNN & BRADSTREET : DBXX71589 CDS : 40099

EMISSIONS CONTACT : ERIKSON, (987)654-3210
LATITUDE : 42:56:15
LONGITUDE : 101:59:47

UTM ZONE : 14
HORIZONTAL : 255.5 KM
VERTICAL : 4758.0 KM

EMERGENCY CONTROL PLAN : 3 - UNKNOWN STATUS
STATE DATA ELEMENT 1 : 111
STATE DATA ELEMENT 9 : STATE DATA ELEMENT 90

USER PLANT ID : 123456789012 NUMBER OF EMPLOYEES : 5 PROPERTY AREA (ACRES) : 0.3
PRINCIPAL PRODUCT : SAILING SHIP REPAIR
AFP64405 -- AFTER AFN64411 #CANNOT-USE: NO

PLANT POLLUTANT:

POLLUTANT	ESTIMATED	UNITS	ALLOWABLE	UNITS	POT. UNCTRL	UNITS	POT. CNTRL	UNITS	ACTUAL UCNTRL	UNITS
10025873			1	TY	1	TY	1	TY	1	TY
NO2	11.34000	PY								
CO	204.5625	PY								
PT	.0000002	PH					1.2	TY		
VOC	8.912200	PY								

POLLUTANT	CO DAILY	UNITS	OZONE DAILY	UNITS	ADJUSTED	UNITS
NO2			.0125000	PD	4.562500	PY
CO	.0125000	PD	.0125000	PD		
VOC			89.12344	PD		

PLANT COMMENT:

Appendix A-1. Continued.

DATE: 03/26/92 AFS PLANT EMISSIONS INVENTORY PGM: AFP644
PAGE: 2

PLANT: 4099 - VALKYRIE SHIPBUILDERS INC CURRENT 1987 YEAR OF EMISSIONS : 1987
STATE: SD/46 CITY: 66700 - VERMILLION SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
COUNTY: 137 - ZIEBACH CO MSA: - NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

COMMENT NO.	COMMENT
001 E	THE SAILS ARE TO BE REPLACED BEFORE THE LAUNCH.
	LINE 2
	LINE 3
	LINE 4

DATE: 03/26/92 **AFS** PLANT EMISSIONS INVENTORY **PGM: AFP644**
PAGE : 3

PLANT:' 4099 • VALKYRIE SHIPBUILDERS **INC** CURRENT 1987 YEAR OF EMISSIONS : 1987
STATE: SD/46 CITY: 66700 • **VERMILLION** SIP INVENTORY INDICATOR : 02 • OZONE SIP INVENTORY
COUNTY: 1 3 7 • **ZIEBACH** C O **MSA:** • NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 **NUMBER OF** SEGMENTS: 3

STACK IWFORMTION: 001 • CNTR OF YARD

STACK HEIGHT **(FT)** : 1249 EXIT GAS TEMPERATURE **(F)** : 1543 **EMISSION** RECORDER : Y
STACK DIAMETER **(FT)** : 0.14 GAS **FLOW** RATE **(ACFM)** : 1234567 STACK LINING : **1** • METAL
PLUME HEIGHT **(FT)** : 15 EXIT GAS VELOCITY **(FT/SEC)** : 2.4 RWGH TERRAIN IND. : Y
UTM HORIZONTAL : 255.50 KM LATITUDE : **42:56:15** GEP STACK HEIGHT **(FT)** : 1124
UTM VERT I CAL : 4758.00 **KM** **LONGITUDE** : **101:59:47** GEP BUILDING **HEIGHT (FT):** 36
GEP BUILDING **LENGTH (FT)** : 98
STACK TYPE CODE: **W** • A VERTICAL STACK **WITH** A **WEATHER** CAP **OR** SIMILAR **OBSTRUC.** IN GEP BUILDING **WIDTH (FT)** : 56

POLLUTANT	ESTIMATED UNITS	MEASURED UNITS		METHOD
10025873		.05	PY	2 • OTHER PARTICULATE SAMPLING TRAIN
NO2	11.34000	Pi		
co	4.562500	PY		
PT	.0000002	P H		
VOC	8.912200	PY		

POLLUTANT	CO DAILY	UNITS	OZONE DAILY	UNITS	ADJUSTED	UNITS
NO2			.0125000	PD	4.562500	PY
co	.0125000	PD	.0125000	PD		
VOC			89.12344	PD		

COMMENT NO.	COMMENT
001 E	TRACE OF PARTICULATE ESCAPE PAST THE **BAGHOUSE.**
	LINE 2
	LINE 3
	LINE 4

STACK **INFORMATION:** 002 •

STACK HEIGHT **(FT)** : 12 EKIT GAS TEMPERATURE **(F)** : **0** **EMISSION** RECORDER :
STACK DIAMETER **(FT)** : 12.00 GAS **FLOW** RATE **(ACFM)** . 0 STACK **LINING** : •
PLUME HEIGHT **(FT)** : EXIT GAS VELOCITY **(FT/SEC)** : 0.0 ROUGH TERRAIN **IND.** :
UTM HORIZONTAL : 0.00 KM **LATITUDE** : **00:00:00** GEP STACK **HEIGHT (FT)** : 0
UTM VERTICAL : 0.00 **KM** **LONGITUDE** : **0:00:00** GEP **BUILDING** HEIGHT **(FT)** : 0
GEP BUILDING **LENGTH (FT)** : 0
STACK TYPE **CODE:** • G E P **BUILDING WIDTH (FT)** : 0

DATE: 03/26/92 AFS ARCHIVE PLANT EMISSIONS INVENTORY PGM: AFP644
PAGE: 4

PLANT: 40%' - VALKYRIE SHIPBUILDERS INC CURRENT 1987
STATE: SD/46 CITY: 66700 - VERMILLION
COUNTY: 137 - ZIEBACH CO MSA: -
YEAR OF EMISSIONS: 1987
SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

POINT INFORMATION: 001 E STACK #'S 001

EMISSIONS POINT DESCRIPTION: EMIS POINT DESCRIP
USER POINT ID : 111
CONFIDENTIAL INDICATOR : N
PERCENT THRUPUT: DEC-FEB: 02%
MAR-HAY: 58%
JUN-AUG: 28%
SEP-NOV: 12%
BURNER TYPE MAKE : AIRDYNE
MODEL : 3 - STEAM ATOMIZER
INSTALLATION DATE : 87/07/15
CONTROL REGULATION : 1234/1234/1234
DESIGN CAPACITY : 12345 HORSEPOWER
OPERATING SCHEDULE:
HOURS PER DAY: 04
DAYS PER WEEK: 5
HOURS PER YEAR: 0530
OPERATIOW START TIME: 0815
OPERATION END TIME: 1715
DRAFT TYPE : 3 - NATURAL
DRAFT CONTROL TYPE : 4 - GUILLOTINE
DRAFT CONTROL LOCATION : 2 - BREECHING
SPACE HEAT : 12.3%
STATE DATA ELEMENT 2: 1
3: 12
4: 1234
5: 123456

POLLUTANT	ESTIMATED	UNITS	STATE	DEF'D	UNITS	MEASURE0	UNITS	METHOD
voc	8.912200	PY	.001	PY	.001	P	Y	2 - OTHER PARTICULATE SAMPLING TRAIN
NO2	11.34000	PY						
co	204.5625	PY						
PT	.0000002	PH						

POLLUTANT	CO DAILY	UNITS	OZONE DAICY	UNITS	ADJUSTED UNITS	LIMIT	UNITS	LIMIT DESCRIPTION	SIP RULE	YEAR REG	YEAR MOD
v o c			89.12344	PD	.001	P	Y	EMIS LIMIT DESCRIP	Y	83	83
NO2			.0125000	P D	4.562500	PY					
co	.0125000	PD	.0125000	P	D						

COMMENT NO.	COMMENT
001 E	WHITE PAINT FOR THE WATER LINE.
	LINE 2
	LINE 3
	LINE 4

POINT TANK INFORMATION: 001 E

Appendix A-l. Continued;

DATE: 03/26/92 AFS ARCHIVE PLANT EMISSIONS INVENTORY PGM: AFP644
PAGE : 5

PLANT: 4099 - VALKYRIE SHIPBUILDERS INC CURRENT 1987 YEAR OF EMISSIONS : 1987
STATE: SD/46 CITY: 66700 - VERMILLION SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
COUNTY: 137 - ZIEBACH CO HSA: - NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

POINT TANK INFORMATION: 001 E

DIAMETER (FT): 0 5 4 HEIGHT (FT) : 024 AGE : 04 YEARS
LOADING TYPE : XXXXXXXXXXXXXXX COLOR: 1 - UNITE
TURNOVER/YR : 0.00

DATA FOR FIXED ROOF TANKS ONLY:
ROOF PAINT COLOR . . . . . a. : 1 - WHITE
SHELL PAINT COLOR . . . . . : 1 - WHITE
PAINT CONDITION . . . . . : G - GOOD
AVERAGE VAPOR SPACE HEIGHT(FT): 12
DIURNAL TEMPERATURE CHANGE (F): 12

DATA FOR FLOATING ROOF TANKS ONLY:
CONSTRUCTION TYPE . . : 1 - EXTERNAL FLOATING ROOF, CONSTRUCTION DETAIL NO
TANK SHELL CONDITION : 3 - GUNITE LINED
DECK CONSTRUCTION . . : 1 - WELDED
SEAL TYPE . . . . . : 5 - RESILIENT SEAL <NONMETALLIC), WITH UEATHER SHI
AVERAGE WIND (MPH). . : 12.12
SUPPORT TYPE . . . . . : 1 - SELF-SUPPORTING FIXED ROOF UITH NO INTERNAL SU

POINT SEGMENT INFORMATION: 001 E/01 (STACK 001) - NAPHTHALENE FOR STRIPPER

SOURCE CLASSIFICATION CODE: 30100101 - CHEMICAL MANUFACTURING - MIPIC ACID - GENERAL
ANNUAL FUEL PROCESS RATE : 01 TONS OF PRODUCT CONFIDENTIAL INDICATOR: N
MAXIMUM OPERATION RATE PER HOUR: 1.000 MSDS(YR): 9 0
PEAK CO SEASON DAILY PROCESS RATE : 2.000 1 - USER INPUT SDE6 : 6 SDE7 : 77777
PEAK OZONE SEASON DAILY PROCESS RATE: 10.000 I - USER INPUT
FUEL DATA: SULFUR: 12.123% ASH: 12.12% HEAT CONTENT: 12345.67 MMBTU - TONS OF PRODUCT
ASH/SULFUR ORIGIN: FEDERAL ASH/SULFUR SOURCE: S SUPPLIER: BEMERS
TANK DATA: SOLVENT DATA: CONTROL EQUIPMENT:
VAPOR PRESSURE : 11.1111 PSIA PURCHASED (GAL) : 123456 COST . . . . . : 12345.67
VAPOR MOL. UT. : 111 LB/LB MOLE REPROCESSED (GAL): 654321 INSTALLATION DATE: 86/07/07
PEAK OZONE SEASON VAPOR PRESSURE : 12.3456 PSIA
POLLUTANT:

CO

	EMISSIONS / UNITS / METHOD		EMISSION FACTOR / ORIGIN / SOURCE
ESTIMATED :	.0125 P D	7 - MATERIAL BALANCE W/ KNOWLEDGE OF PROCESS	12345.6 FEDERAL 7
MEASURED :	.0125 P D	2 - OTHER PARTICULATE SAMPLING TRAIN	
CO DAILY :	.0125 PD	2 - MATERIAL BALANCE W/ KNOULEDGE OF PROCESS	
OZONE DAILY:	.0125 P D	2 - MATERIAL BALANCE W/ KNOULEDGE OF PROCESS	
BANKED	.1 TY		

Appendix A-l. Continued.

DATE: 03/26/92 AFS PLANT EMISSIONS INVENTORY PGM: AFP644
PAGE : 6

PLANT: 4099 - VALKYRIE SHIPBUILDERS INC CURRENT 1987 YEAR OF EMISSIONS : 1987
STATE: SD/46 CITY: 66700 - VERMILLION SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
COUNTY: 137 - ZIEBACH CO WSA: - NUMBER Of STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

POINT SEGMENT INFORMATION: 001 E/01 (STACK 001) - NAPHTHALEWE FOR STRIPPER

CONTROL EQUIPMENT:
PRIMARY : 001 - YET SCRUBBER - HIGH EFFICIENCY EFFICIENCY: 12.345% ADJUSTED EFFICIENCY: 0.000%
SECONDARY: 086 - WATER CURTAIN METHOD: 5 - CALCULATED, BASED ON MATERIAL BALA
RULE EFFECTIVENESS: % METHOD : - ADJ METHOD : -
SIP RULE IN PLACE : YEAR REGULATED: YEAR LAST MODIFIED : SEASONAL ADJUSTMENT FACTOR:
TRACE ELEMENT : 0.0000008% METHOD: 4 - ESTIMATE FROM LITERATURE SDE8: 8

NO2	EMISSIONS / UNITS / METHOD			EMISSION FACTOR / ORIGIN / SWRCE		
ESTIMATED :	.00567	TY	2 - MATERIAL BALANCE W/ KNOWLEDGE OF PROCESS	12345.6	FEDERAL	7
MEASURED :	.0125	TY	2 - OTHER PARTICULATE SAMPLING TRAIN			
OZONE DAILY:	.0125	PD	2 - MATERIAL BALANCE W/ KNOWLEDGE OF PROCESS			
ADJUSTED :	.0125	P D	2 - MATERIAL BALANCE W/ KNOWLEDGE OF PROCESS	.6		
BANKED	.0125	P D				
LIMIT	.0125	PO				

LIMIT-DESCRIPTION: EMIS LIMIT DESCRIP

CONTROL EQUIPMENT:
PRIMARY : 001 - WET SCRUBBER - HIGH EFFICIENCY EFFICIENCY: 12.345% ADJUSTED EFFICIENCY: 12.345%
SECONDARY: 086 - WATER CURTAIN METHOD: 5 - CALCULATED, BASED ON MATERIAL BALA
RULE EFFECTIVENESS: 100% METHOD : D - DEFAULT VALUE (80%) ADJ METHOD: 1 - TESTED EFFICIENCY, BASED ON EPA RE
SIP RULE IN PLACE : Y YEAR REGULATED: 84 YEAR LAST MODIFIED : 83 SEASONAL ADJUSTMENT FACTOR: 0
TRACE ELEMENT : 0.0000008% METHOD: 4 - ESTIMATE FROM LITERATURE SDE8: 8

PT	EMISSIONS / UNITS / METHOD			EMISSION FACTOR / ORIGIN / SWRCE		
ESTIMATED :	.0000013	TY	8 - AFS NATIONAL EMISSION FACTOR (COMPUTER-C-	CONTROL EQUIPMENT:		
PRIMARY :	007 - CENTRIFUGAL		COLLECTOR - HIGH EFFICIENCY	EFFICIENCY: 99.700%	ADJUSTED EFFICIENCY:	0.000%
SECONDARY:	-			METHOD: -		
TRACE ELEMENT :	0.0000000%	METHOD: -		SDE8:0		

VOC	EMISSIONS / UNITS / METHOD			EMISSION FACTOR / ORIGIN / SWRCE
ESTIMATED :	.0044561	TY	8 - AFS NATIONAL EMISSION FACTOR (COMPUTER-C	
OZONE DAILY:	89.12344	PO	8 - AFS NATIONAL EMISSION FACTOR (COMPUTER-C	

LIMIT-DESCRIPTION: DESCRIP

Append& A-l. Continued.

PLANT: 4099 - VALKYRIE SHIPBUILDERS INC CURRENT 1987 YEAR OF EMISSIONS : 1987
STATE: SD/46 CITY: 66700 - VERMILLION SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
COUNTY: 137 - ZIEBACH CO MSA: - NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

POINT SEGMENT INFORMATION: 001 E/01 (STACK 001) - NAPHTHALENE FOR STRIPPER

CONTROL EQUIPMENT:
PRIMARY : 001 - YET SCRUBBER - HIGH EFFICIENCY EFFICIENCY: 98.910% ADJUSTED EFFICIENCY: 0.000%
SECONDARY: - METHOD: 1 - TESTED EFFICIENCY, BASED ON EPA RE
RULE EFFECTIVENESS: 80% METHOD : D - DEFAULT VALUE (80%) A D J METHOD: -
SIP RULE IN PLACE : Y YEAR REWLATED: 76 YEAR LAST MODIFIED : SEASONAL AD JUSTHENT FACTOR:
TRACE ELEMENT : 0.00000000% METHOD: - SDE8: O T
EMISSIONS / UNITS / METHOD EMISSION FACTOR/ORIGIN/SOURCE
MEASURED : .1 TY 1 - U.S. EPA REFERENCE METHOD
CONTROL EQUIPMENT:
PRIMARY : - EFFICIENCY: 0.000% ADJUSTED EFFICIENCY: 0.000%
SECONDARY: - METHOD: -
TRACE ELEMENT : 0.0000000% METHOD: - SDE8:-CHEMICAL INFORMATION: 0

CAS NUMBER	DENSITY	WGHT%
7446095	.1	12.21

COMMENT NO.	COMMENT
001 E	AFTER STRIPPING THE WOOD , USE SNAPPY TEAK NEW.
	LINE 2
	LINE 3
	LINE 4

POINT SEGMENT PROJECTED INFORMATION: 001 E/01 (STACK 001)

PROJECTION YEAR: 94 INVENTORY TYPE: M - MODELING PROJECTION EMISSIONS TYPE INDICATOR: GB - GROWTH AND BASE YEAR CONTROLS

DATE: 03/26/92 AFS PLANT EMISSIONS INVENTORY PGM: AFP644
PAGE: 8

PLANT: 4099 - VALKYRIE SHIPBUILDERS INC CURRENT 1987 YEAR OF EMISSIONS : 1987
STATE: SD/46 CITY: 66700 - VERMILLION SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
COUNTY: 137 - ZIEBACH CO MSA: - NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

POINT SEGMENT PROJECTEO INFORMATION: 001 E/01 (STACK 001)

NO2 EMISSIONS / UNITS / METHOD
PROJECTED : .00004 P Y 01 -
LIMIT : .0005 P Y
LIMIT-DESCRIPTION: PROJECTION LIMIT DESCRIPTIO
GROWTH FACTOR : 11.11
SIP RULE IN PLACE: Y
YEAR REGULATED : 83-

CONTROL EQUIPMENT:
PRIMARY : 001 - WET SCRUBBER - HIGH EFFICIENCY EFFICIENCY: 12.345%
SECONDARY: 002 - WET SCRUBBER - MEDIUM EFFICIENCY METHOD: 1 - TESTED EFFICIENCY, BASED ON EPA REFERENC
RULE EFFECTIVENESS: 84% METHOD : D - DEFAULT VALUE (80%)

POINT SEGMENT INFORMATION: 001 E/02 (NO STACK)

SOURCE CLASSIFICATION CODE: 30100101 - CHEMICAL MANUFACTURING - ADIPIC ACID
- GENERAL
ANNUAL FUEL PROCESS RATE : TONS OF PRODUCT CONFIDENTIAL INDICATOR:
MAXIMUM OPERATION RATE PER HOUR: 0.000 MSDS (YR):
PEAK CO SEASON DAILY PROCESS RATE : 0.000 SDE6 : SDE7 :
PEAK OZONE SEASON DAILY PROCESS RATE: 0.000
FUEL DATA: SULFUR: 0.000% ASH: 0.00% HEAT CONTENT : 0.00 MMBTU - TONS OF PRODUCT
ASH/SULFUR ORIGIN: ASH/SULFUR SOURCE: SUPPLIER:
TANK DATA: SOLVENT DATA: CONTROL EQUIPMENT:
VAPOR PRESSURE : 0.0000 PSIA PURCHASED (GAL) : 0 COST . . . . . : 0.00
VAPOR MOL. UT. : 0 LB/LB MOLE REPROCESSED (GAL): 0 INSTALLATION DATE: / /
PEAK OZONE SEASON VAPOR PRESSURE : 0.0000 PSIA
POLLUTANT:
****

CO EMISSIONS / UNITS / METHOD EMISSION FACTOR / ORIGIN / SOURCE
ESTIMATED : .1 TY 1 - SWRCE TEST OR OTHER EMISSION MEASUREMENT
CONTROL EPUIPHENT:
PRIMARY : -
SECONDARY: - EFFICIENCY: 0.000% ADJUSTED EFFICIENCY: 0.000%
METHOD: -

Appendix A-l. Continued.

PLANT: 4099 - VALKYRIE SHIPBUILDERS INC CURRENT 1987 YEAR OF EMISSIONS: 1987
STATE: SD/46 CITY: 66700 - VERMILLION SIP INVENTORY INDICATOR : 02 - OZONE SIP INVENTORY
COUNTY: 137 - ZIEBACH CO HSA: - NUMBER OF STACKS: 2 NUMBER OF POINTS: 2 NUMBER OF SEGMENTS: 3

POINT SEGMENT INFORMATION: 001 E/02 (MO STACK)

RULE EFFECTIVENESS: % METHOD : - ADJ METHOD: -
SIP RULE IN PLACE : YEAR REGULATED: YEAR LAST MODIFIED : SEASONAL ADJUSTMENT FACTOR:
TRACE ELEMENT : 0.0000000% METHOD: - SDE8:-

POINT INFORMATION: 005 f

EMISSIONS POINT DESCRIPTION:
USER POINT ID CONTROL REGULATION : / / SPACE HEAT : 00.0%
CONFIDENTIAL INDICATOR : DESIGN CAPACITY 0
PERCENT THRUPUT: DEC- FEB: 00% OPERATING SCHEDULE: STATE DATA ELEMENT 2:
MAR-MAY: 00% HOURS PER OAY: 00 OPERATION START TIME: 3:
JUN-AUG: 00% DAYS PER WEEK: 0 OPERATION END TIME: 4:
SEP-NOV: 00% HOURS PER YEAR: 0000 5:
BURNER TYPE MAKE : DRAFT TYPE : -
MODEL : - DRAFT CONTROL TYPE : -
INSTALLATION DATE : / / DRAFT CONTROL LOCATION : -

POINT SEGMENT INFORMATION: 005 E/01 (NO STACK)

SOURCE CLASSIFICATION CODE: 50300101 - SOLID WASTE DISPOSAL - INDUSTRIAL - INCINERATION - MULTIPLE CHAMBER
ANNUAL FUEL PROCESS RATE : TONS BURNED CONFIDENTIAL INDICATOR:
MAXIMUM OPERATION RATE PER HOUR: 0.000 HSDS (YR):
PEAK CD SEASON DAILY PROCESS RATE : 0.000 SDE6 : SDE7 :
PEAK OZONE SEASON DAILY PROCESS RATE: 0.000
FUEL DATA: SULFUR: 0.000% ASH: 0.00% HEAT CONTENT: 0.00 MMBTU - TONS BURNED
ASH/SULFUR ORIGIN: ASH/SULFUR SOURCE: SUPPLIER:
TANK DATA: SOLVENT DATA: CONTROL EQUIPMENT:
VAPOR PRESSURE : 0.0000 PSIA PURCHASE0 (GAL) : 0 COST . . . . . : 0.00
VAPOR MOL. UT. : 0 LB/LB HOLE REPROCESSED (GAL): 0 INSTALLATION DATE: / /
PEAK OZONE SEASON VAPOR PRESSURE : 0.0000 PSIA

Appendix A-2. AFS Report **AFP649** - *AFS* **County Point Source Summary**

DATE : 03/20/92 AFS COUNTY POINT SOURCE SUMMARY PGM: AFP649

STATE: 48 TEXAS COUNTY: 201 HARRIS CO

PLANT	NAME AND ADDRESS		SIC	AQC	UTZ	UTMH	UTMV	# OF POINTS	YR	VOC				
	CHEMICAL EXCHANGE INDUSTRIBAYTOWN		2869	216	15	305.0	3293.1	4	85	103.0	0.0	0.0	0.0	0.0
0534	NO STREET ADDRESS													
	NO CITY NAME	00000												
00003	HOECHST CELANESE CHE		2869	216	15	300.2	3278.6	74	85	2054.9	0.0	0.0	0.0	0.0
0003	9502 BAYPORT ROAD													
	PASADENA	75011												
00006	CRWN CENTRAL PETROL		2911	216	15	266.7	3290.1	106	88	1398.0	0.0	0.0	0.0	0.0
0006	111 RED BLUFF ROAD													
	HOUSTON	77501												
00008	FINA OIL AND CHEMICA		2821	216	15	298.1	3290.5	35	88	1314.0	0.0	0.0	0.0	0.0
0008	HIGHWAY 134 & MILLER													
	LA PORTE	77536												
00009	OCCIDENTALCHEMICAL		2869	216	15	295.7	3291.0	130	88	1060.0	0.0	0.0	0.0	0.0
0009	TIDAL ROAD													
	DEER PARK	77536												
00010	AMERICAN NATIONAL CA		3411	216	15	280.1	3296.2	39	88	226.0	0.0	0.0	0.0	0.0
0010	8501 EAST FREEWAY													
	HOUSTON	75011												
00013	EXXON CHEMICAL AMERI		2869	216	15	279.5	3293.6	32	65	31.0	0.0	0.0	0.0	0.0
0013	8230 STEDMAN STREET													
	HOUSTON	75011												
00014	EXXON CHEMICAL AMERI		2869	216	15	304.8	3292.1	165	88	4172.0	0.0	0.0	0.0	0.0
0014	5000 BAYWAY DRIVE													
	BAYTOWN	77520												
00015	ETHYL CORPORATION		2869	216	15	290.4	3291.0	189	88	4568.0	0.0	0.0	0.0	0.0
0015	SOUTH BOULEVARD													
	PASADENA	77503												
00022	EXXON CORPORATION US		1321	216	15	246.4	3329.3	32	85	103.0	0.0	0.0	0.0	0.0
0022	2.4 MI. FROM DWNTW													
	TOMBALL	77375												
00023	EXXON CORPORATION		1321	216	15	293.5	3278.0	44	85	159.0	0.0	0.0	0.0	0.0
0023	51210 RED BLUFF-GENO													
	PASADENA	77507												
00027	EXXON COMPANY USA		2911	216	15	305.2	3292.1	420	88	13079.9	0.0	0.0	0.0	0.0
0027	2800 DECKER DRIVE													
	BAYTOWN	77520												
00031	TEXAS PETROCHEMICALS		2869	216	15	281.8	3287.4	167	85	5195.0	0.0	0.0	0.0	0.0
0031	8600 PARK PLACE BLVD													
	HOUSTON	77017												
00033	REICHHOLD CHEMICALS		9999	216	15	288.4	3294.7	15	85	1157.0	0.0	0.0	0.0	0.0
0033	1503 HADEN													
	HOUSTON	77015												
00039	SHELL OIL COMPANY		2911	216	15	294.1	3290.0	751	88	12927.9	0.0	0.0	0.0	0.0
0039	HWY 225 OF BATTLE GR													
	DEER PARK	77536												
00040	LYONDELL PETROCHEMIC		2911	216	15	283.7	3289.4	244	88	4662.0	0.0	0.0	0.0	0.0
0040	12000 LAWNDALE													
	HOUSTON	77017												

Appendix A-2. Continued.

DATE : 03/20/92 AFS COUNTY POINT SOURCE SUMMARY PGM: AFP649

STATE: 48 TEXAS COUNTY: 201 HARRIS CO

PLANT	NAME AND ADDRESS		SIC	AQC	UTZ	UTMH	UTMV	# OF POINTS	YR	TOTAL VOC				
00046	HOUSTON LIGHTING AND		4911	216	15	285.0	3300.1	19	85	21.0	0.0	0.0	0.0	0.0
0046	12070 OLD BEAUMONT H													
	HOUSTON	77015												
00052	TEXAS ALKYLS INCORPO		2869	216	15	298.0	3287.6	42	85	105.0	0.0	0.0	0.0	0.0
0052	730 BATTLEGROUND ROA													
	DEER PARK	77536												
00055	QUANTUM CHEMICAL COM		2869	216	15	300.4	3288.3	220	88	5784.0	0.0	0.0	0.0	0.0
0055	1515 MILLER CUT-OFF													
	DEER PARK	77536												
00059	TENNECO METHANOL COM		2869	216	15	292.0	3290.7	99	88	365.0	0.0	0.0	0.0	0.0
0059	HWY 225 PASADENA													
	PASADENA	77501												
00062	AMERADA HESS CORWRA		4226	216	14	771.2	3293.2	55	85	218.0	0.0	0.0	0.0	0.0
0062	12901 AMERICAN PETRO													
	GALENA PARK	77457												
00075	LYONDELL PETROCHEMIC		2869	216	15	296.0	3301.7	217	88	1273.0	0.0	0.0	0.0	0.0
0075	8280 SHLEDON ROAD													
	CHANNELVIEW	77530												
00076	ANHEUSER BUSCH INCOR		2082	216	15	280.6	3295.6	15	85	9.0	0.0	0.0	0.0	0.0
0076	775 GELLHORN DRIVE													
	HOUSTON	77013												
00078	DIXIE CHEMICAL COMPA		2869	216	15	301.5	3277.3	138	85	99.0	0.0	0.0	0.0	0.0
0078	10701 BAY AREA BLVD													
	HOUSTON	77571												
00087	REEF INDUSTRIES INCO		9999	216	15	276.5	3280.3	16	88	210.0	0.0	0.0	0.0	0.0
0087	10020 MYKAWA													
	HOUSTON	77048												
00088	GOODYEAR TIRE AND RU		2822	216	15	281.1	3287.4	212	85	4840.8	0.0	0.0	0.0	0.0
0088	2000 GOODYEAR DR.													
	HOUSTON	75011												
00091	GATX TERMINALS CORPO		4226	216	15	212.8	3266.9	152	85	987.9	0.0	0.0	0.0	0.0
0091	906 CLINTON DRIVE													
	GALENA PARK	77547												
00092	GATX TERMINALS CORPO		5171	216	15	287.0	3296.0	95	85	1360.0	0.0	0.0	0.0	0.0
0092	530 NORTH YITTER STR													
	PASADENA	77506												
00094	FMC CORPORATION		2819	216	15	302.6	3279.3	34	85	35.0	0.0	0.0	0.0	0.0
0094	12000 BAY AREA BOULE													
	HOUSTON	77507												
00117	MOBIL CHEMICAL COMPA		2869	216	15	282.3	3287.6	36	85	237.0	0.0	0.0	0.0	0.0
0117	9822 LA PORTE FRWY.													
	HOUSTON	75011												
00118	TEXAS EASTERN PRODUC		4789	216	15	305.4	3294.1	28	88	214.0	0.0	0.0	0.0	0.0
0118	4227 DECKER DRIVE &													
	BAYTOWN	77520												
00152	PHILLIPS PIPE LINE C		5171	216	15	289.4	3289.3	26	88	312.0	0.0	0.0	0.0	0.0
0152	HWY 225 AND JEFFERSO													
	PASADENA	77501												

Appendix A-3. AFS Report AFP634 - Emission Ranking for a Pollutant: VOC

EMISSION RANKING FOR A POLLUTANT: VOC / PROGRAM: AFP634

PAGE: 1

TOTAL EMISSIONS: 99708 (TONS/YEAR) ARCHIVE YEAR: N/A

RANK	REGION	STATE	AQCR	COUNTY	PLANT	NAME/ADDRESS	UTMH	UTMV	YEAR OF EMISSIONS	TOTAL PLANT EST EMISSIONS TONS/ YEAR	%OF TOTAL	CUM % TOTAL
1	06	48	216	201	0027 00027	EXXON COMPANY USA 2800 DECKER DRIVE BAYTOWN	305.2	3292.1	88	13079	13.1	13.1
2	06	48	216	201	0039 00039	SHELL OIL COMPANY HWY 225 OF BATTLE GR DEER PARK	294.1	3290.0	88	12927	12.9	26.0
3	06	48	216	201	0055 00055	QUANTUM CHEMICAL COM 1515 MILLER CUT-OFF DEER PARK	300.4	3288.3	88	5784	5.8	31.6
4	06	48	216	201	0031 00031	TEXAS PETROCHEMICALS 8600 PARK PLACE BLVD HOUSTON	281.8	3207.4	85	5195	5.2	37.0
5	06	48	216	201	0088 00088	GOODYEAR TIRE AND RU 2000 GOODYEAR DR. HOUSTON	281.1	3287.4	65	4640	4.8	41.9
6	06	48	216	201	0034 00034	ROHM AND HAAS TEXAS P. O. BOX 672 - DEER DEER PARK	340.3	3393.3	88	4766	4.7	46.7
7	06	48	216	201	0040 00040	LYONDELL PETROCHEMIC 12000 LAWNDALE HOUSTON	203.7	3209.4	88	4662	4.6	51.4
8	06	48	216	201	0015 00015	ETHYL CORPORATION SOUTH BOULEVARD PASADENA	290.4	3291.0	88	4568	4.5	55.9
9	06	48	216	201	0036 00036	SHELL OIL COMPANY STATE HVY. 225 DEER PARK	340.3	3393.3	88	4551	4.5	60.5
10	06	48	216	201	0014 00014	EXXON CHEMICAL AMER I 5000 BAYWAY DRIVE BAYTOWN	304.8	3292.1	88	4172	4.1	64.7
11	06	48	216	201	0021 00021	J M HUBER CORPORATIO NEEDLEPOINT RD. CARB BAYTOWN	315.1	3299.3	85	3545	3.5	68.2

Appendix A-3. Continued.

DATE 03/20/92 EMISSION RANKING FOR A POLLUTANT: VOC / PROGRAM: AFP634
PAGE: 2

TOTAL EMISSIONS: 99708 (TONS/YEAR) ARCHIVE YEAR: N/A

RANK	REGION	STATE	AQCR	COUNTY	PLANT	NAME/ADDRESS	UTMH	UTMV	YEAR OF EMISSIONS	TOTAL PLANT EST EMISSIONS TONS/ YEAR	% OF TOTAL	CUM % TOTAL
12	06	48	216	201	0178 00178	ISK BIOTECH CORPORAT 2239 HADEN ROAD PASADENA	290.5	3294.3	88	3132	3.1	71.4
13	06	48	216	201	0003 00003	HOECHST CELANESE CHE 9502 BAYPORT ROAD PASADENA	300.2	3278.6	85	2054	2.0	73.4
14	06	48	216	201	0065 00065	PHIBRO REFINING INC 9701 MANCHESTER HOUSTON	0.0	0.0	88	1743	1.7	75.2
15	06	48	216	201	0018 00018	CHEVRON CHEMICAL COM 9500 IH-10 EAST BAYTOWN	314.8	3300.4	88	1405	1.4	76.6
16	06	48	216	201	0006 00006	CROWN CENTRAL PETROL 111 RED BLUFF ROAD HOUSTON	286.7	3290.1	88	1398	1.4	78.0
17	06	48	216	201	0248 00248	PAKTANK CORPORATION 2759 BATTLEGROUND RO DEER PARK	297.2	3292.0	85	1364	1.3	79.4
18	06	48	216	201	0092 00092	GATX TERMINALS CORPO 530 NORTH WITTER STR PASADENA	287.0	3296.0	85	1360	1.3	80.7
19	06	48	216	201	0008 00008	FINA OIL AND CHEMICA HIGHWAY 134 & MILLER LA PORTE	298.1	3290.5	88	1314	1.3	82.1
20	06	48	216	201	0075 00075	LYONDELL PETROCHEMIC 8280 SHLEDON ROAD CHANNELVIEW	296.0	3301.7	88	1273	1.2	83.3
21	06	48	216	201	0048 00048	PHILLIPS 66 COMPANY HWY 255 AT JEFFERSON PASADENA	289.0	3290.4	88	1227	1.2	84.6
22	06	48	216	201	0033 00033	REICHHOLD CHEMICALS 1503 HADEN HOUSTON	288.4	3294.7	85	1157	1.1	85.7

APPENDIX B

SAMPLE AIRS AREA AND MOBILE SOURCE (AMS)-PC REPORTS

This appendix contains a sample report printout from the AMS-PC database. Several example pages are provided for AMS Report AMSR6100 - Detailed Inventory Report. This report illustrates an example of the fixed form report that is available in AMS-PC. The examples shown in the appendix were extracted from Version 2.0 of AMS-PC just released. The report illustrates a useful way to summarize and present base year area source data for the inventory documentation report.

DATE: 03/26/92 AREA AND MOBILE SOURCE - PC INVENTORY REPORT PAGE: 2
PGM: AMSR6100

INVENTORY TYPE: BASE YEAR DETAILED INVENTORY REPORT BASE YEAR: 1990
PROVIDER.....: STATE Example AMS Report Printouts

STATE: NC (37) - NORTH CAROLINA
COUNTY: 21 - BUNCOMBE CITY: 6140 - BLACK MOUNTAIN ZONE: 0000

CATEGORY DATA

SOURCE CATEGORY: 24/25/010/000
Lithography -- Total: All Solvent Types

ACTIVITY	VALUE	UNITS	PROCESS
LEVEL	350,100.	374-Persons	0 Not Applicable
LEVEL LIMIT :			
NEW CONTROLS:	+++++		
GROWTH FACTOR :	+++++		
HEY CONTROLS :	+++++		

ASH CONTENT(%) :
SULFUR CONTENT(%):
FUEL LOADING : N/A
DAYS PER WEEK : 5 WEEKS PER YEAR: 52

CATEGORY COMMENT

This is a' lithoplant.

POLLUTANT DATA

POLLUTANT: VOC (43104)-VOLATILE ORGANIC COMPOUNDS
EMISSION TYPE: AC - ACTUAL

	VALUE	UNITS	CALC
ANNUAL EMISSIONS :	174.09632	Tons/Year	X
EMISSION FACTOR	1.3	565-lb/person (S/C)	
EMISSION FACTOR LIMIT:	########		
NEW CONTROLS	+++++		
REACTIVITY (%)	0.00		

CONTROLS

SIP RULE IN PLACE : R-RACT YEAR REGULATED: 1985
RULE EFFECTIVENESS: YEAR MODIFIED : 1985
RULE PENETRATION : 50.0 (S/C) CONTROL EFF : 58.74 (S/C)
CTG CLASS +++

POLLUTANT COMMENT

VOC emissions estimated from Heatset Lithography only.

PERIOD DATA

PERIOD: PO - Peak Ozone Season

MONTH BEG - END	PERIOD THRUPUT(%)	ADJUSTMENT FACTORS WKDAY(%)	SAT(%)	SUN(%)
JUN - AUG	25.0(S/C)			(/)

PERIOD EMISSIONS : 1.339.202
EMISS FACTOR : 1.3 565-lb/person (S/C)
EMISSFACTOR LIMIT: 0.0
LIMIT-NEW CTRLS:

INTERVAL CODE: #
START HOUR: XX
INTERVAL EMISSIONS: +++++
INTERVAL THRUPUT : 999.9 (X/X)

- Indicates missing data +++++ - Indicates not available in AMS-PC

```
DATE: 03/26/92                    AREA AND MOBILE SOURCE - PC                    PAGE:  1
                                      INVENTORY  REPORT                          PGM: AMSR6100
-------------------------------------------------------------------------------------------
INVENTORY TYPE: BASE YEAR          DETAILED  INVENTORY  REPORT          BASE YEAR: 1990
PROVIDER.....: STATE               Example  AMS  Report  Printouts
-------------------------------------------------------------------------------------------

                                   STATE: NC (37)   NORTH CAROLINA
COUNTY:   21 - BUNCOMBE            CITY: 6140 - BLACK MOUNTAIN      ZONE: 0000

---------- CATEGORY DATA ----------                ---------- POLLUTANT DATA ----------
SOURCE CATEGORY: 21/04/006/000                      POLLUTANT: CO (42101)-CARBON MONOXIDE
  Natural Gas -- Total: All Combustor Types         EMISSION TYPE: AC - ACTUAL

ACTIVITY          VALUE     UNITS                 PROCESS
                                                                  VALUE     UNITS                CALC

LEVEL             109,953.  258-10^6 Cubic Feet 1 Burned   ANNUAL EMISSIONS    : 1,099.53 Tons/Year      X
LEVEL LIMIT :                                   EMISSION FACTOR              20. 522-lb/10^6 cubic fe(S/C)
NEW CONTROLS:       +++++                       EMISSION FACTOR LIMIT: #########
                                                  NEW CONTROLS               +++++
GROWTH FACTOR :     +++++                       REACTIVITY(%)              100.00              (E/N)
  NEW CONTROLS :    +++++
                                                ---------- CONTROLS ----------
ASH CONTENT(%) :                                SIP RULE IN PLACE : N-NONE      YEAR REGULATED:  N/A
SULFUR CONTENT(%):                              RULE EFFECTIVENESS:             YEAR MODIFIED :  N/A
FUEL LOADING      : N/A                         RULE PENETRATION :  N/A         CONTROL EFF   : #####
DAYS PER WEEK     : 7    WEEKS PER YEAR: 52                                     CTG CLASS     : +++

                CATEGORY COMMENT                          POLLUTANT COMMENT

Residential Natural Gas Combustion. Activity data was     Emission factor data source: AP-42.
obtained from Black Mountain Natural Gas, Inc. 1990 data.

-------------------------------------------------PERIOD DATA-------------------------------------------------
                                   PERIOD: PC - Peak CO Season

  MONTH          PER100                ADJUSTMENT  FACTORS
BEG - END        THRUPUT(%)      WKDAY(%)    SAT(%)    SUN(%)
DEC - FEB         60.0(S/C)                                ( / )

PERIOD EMISSIONS :  14,499.29                                        INTERVAL CODE: #
EMISS FACTOR                20. 522-lb/10^6 cubic fe                 ( / )   START HOUR: XX
EMISS FACTOR LIMIT:         0.0                                      INTERVAL EMISSIONS: +++++
   LIMIT-NEW CTRLS:                                                  INTERVAL THRUPUT : 999.9 (X/X)

# - Indicates missing data     +++++ - Indicates not available in AMS-PC
```

DATE: 03/26/92 — AREA AND MOBILE SOURCE - PC — PAGE: 4
INVENTORY REPORT — PGM: AMSR6100

INVENTORY TYPE: BASE YEAR — DETAILED INVENTORY REPORT — BASE YEAR: 1990
PROVIDER.....: STATE — Example AMS Report Printouts

STATE: NC (37) - NORTH CAROLINA
COUNTY: 57 - DAVIDSON — CITY: 00000 — ZONE: 0000

CATEGORY DATA

SOURCE CATEGORY: 28/01/500/000
Agricultrual Field Burning -- Total

ACTIVITY	VALUE	UNITS	PROCESS
LEVEL	4.500.	301-Acres Burned	1 Burned
LEVEL LIMIT :			
NEW CONTROLS:	+++++		
GROVTH FACTOR :	+++++		
NEW CONTROLS :	+++++		
ASH CONTENT(%) :			
SULFUR CONTENT(%):			
FUEL LOADING :	1.9	801	(S/C)
DAYS PER WEEK : 7	WEEKS PER YEAR: 52		

CATEGORY COMMENT

Activity level data obtained from Davidson County Agricultural Extension Service. 1990. Fuel Loading factor obtained from AP-42.

POLLUTANT DATA

POLLUTANT: VOC (43104)-VOLATILE ORGANIC COMPOUNDS
EMISSION TYPE: AC - ACTUAL

	VALUE	UNITS	CALC
ANNUAL EMISSIONS :	72.675	Tons/Year	X
EMISSION FACTOR	17.	510-lb/ton	(S/C)
EMISSION FACTOR LIMIT:	########		
NEW CONTROLS	+++++		
REACTIVITY (%) :	0.00		

CONTROLS

SIP RULE IN PLACE :	N-NONE	YEAR REGULATED:	N/A
RULE EFFECTIVENESS:		YEAR MODIFIED :	N/A
RULE PENETRATION :	N/A	CONTROL EFF :	#####
		CTG CLASS :	+++

POLLUTANT COMMENT

PERIOD DATA

PERIOD: PO - Peak Ozone Season

MONTH BEG - END	PERIOD THRUPUT(%)	ADJUSTMENT FACTORS WKDAY(%)	SAT(%)	SUN(%)
JUN - AUG	10.0(S/C)			(/)

PERIOD EMISSIONS : 399.31318
EMISS FACTOR 17. 510-lb/ton (S/C)
EMISS FACTOR LIMIT: 0.0
LIMIT-NEW CTRLS:

INTERVAL CODE: #
START HOUR: XX
INTERVAL EMISSIONS: +++++
INTERVAL THRUPUT : 999.9 (X/X)

- Indicates missing data +++++ - Indicates not available in AMS-PC

Appendix B. Continued.

```
DATE: 03/26/92                    AREA AND MOBILE SOURCE - PC                    PAGE: 12
                                      INVENTORY REPORT                           PGH: AMSR6100
-------------------------------------------------------------------------------------------
INVENTORY TYPE: BASE YEAR              DETAILED INVENTORY REPORT                BASE YEAR: 1990
PROVIDER.....: STATE                   Example AMS Report Printouts

                                  STATE: TN (47) - TENNESSEE
COUNTY:  37 - DAVIDSON            CITY: 00000          ZONE: 0000

----------CATEGORYDATA----------          ----------  POLLUTANT DATA  ----------
SOURCE CATEGORY: 25/01/060/053            POLLUTANT: VOC (43104)-VOLATILE ORGANIC COMPOUNDS
  Gasoline Service Stations -- Stage 1: Balanced Sub   EMISSION TYPE: AC - ACTUAL

ACTIVITY          VALUE     UNITS              PROCESS

LEVEL    :     494.430.  252-10^3 Gallons     4 Throughput
LEVEL LIMIT :
NEWCONTROLS:       +++++

GROVTH FACTOR :   +++++
  NEW CONTROLS :  +++++

ASH CONTENT(%) :
SULFUR CONTENT(%):
FUEL LOADING      : N/A
DAYS PER WEEK     :7    WEEKS PER YEAR: 52

                  CATEGORY COMMENT

Tennessee State gas tax records used to determine
activity level data. 1990.

                                          VALUE     UNITS                          CALC
ANNUAL EMISSIONS      ; 27.648525 Tons/Year                                        X
EMISSION FACTOR            0.3 516-lb/10^3 gallons (S/C)
EMISSION FACTOR LIMIT: #########
  NEW CONTROLS             +++++
REACTIVITY (%) :    100.00                                  (E/N)

----------CONTROLS----------
SIP RULE IN PLACE : R-RACT        YEAR REGULATED: ####
RULE EFFECTIVENESS: 080.0 (S/C) YEAR MODIFIED :  ####
RULE PENETRATION : 80.0 (S/C) CONTROL EFF     : 98.00 (S/C)
                                  CTG CLASS :  +++

                  POLLUTANT COMMENT

Balanced Submerged filling control equipment.

----------PERIOD DATA----------
PERIOD: PO - Peak Ozone Season

  MONTH          PERIOD                ADJUSTMENT FACTORS
BEG - END        THRUPUT(%)     WKDAY(%)   SAT(%)   SUN(%)
JUN - AUG         25.0( / )                          ( / )

PERIOD EMISSIONS : 407.49725
EMISS FACTOR              .3 516-lb/10^3 gallons     ( / )
EMISSFACTOR LIMIT:      0.0
   LIMIT-NEV CTRLS:

INTERVAL CODE: #
START HOUR: XX
INTERVAL EMISSIONS: +++++
INTERVAL THRUPUT : 999.9 (X/X)

# - Indicates missing data      +++++ - Indicates not available in AMS-PC
```